Sigart Newsletter

No. 99 **January 1987**

The **SIGART** *Newsletter* is a quarterly publication of the Special Interest Group on Artificial Intelligence of the Association for Computing Machinery, and is published each January, April, July, and October.

Contributions

The editors encourage **contributions**, including letters to the editor, technical contributions (1 to 6 pages), comments, abstracts, book reviews, bibliographies of special topics in **AI**, news items, conferences, puzzles, poems, cartoons, problems for **AI** courses, etc. Material may be reproduced from the *Newsletter* for non-commercial use with credit to the author and **SIGART**. The **deadline** for each issue is the begining of the month *before* the date on the issue (January, April, July and October). Anyone interested in acting as editor for a special issue of the *Newsletter* devoted to a particular topic in **AI** is invited to contact the Editor. Letters to the Editor will be considered as submitted for publication unless they contain a request to the contrary. Technical papers appearing in this issue are unrefereed working papers, and the opinions expressed are those of the individual author and not the official position of **SIGART**, the **ACM**, or any organization with which the writer may be affiliated. For those with access to the ARPAnet, materials may be submitted by netmail to the editor, and in SCRIBE format if possible. Camera ready copy in 4.25 inch (10.795cm) columns, **single spaced**, may be used as is.

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You are invited to join and participate actively. To join contact ACM including name, address, and ACM number:

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No. 99 **January 1987**

TABLE OF CONTENTS

OFFICER'S REPORTS

Editors's Comments

This issue begins another year for the Newsletter. We have a somewhat larger issue this time with the usual abstracts, reports, articles, and some book reviews. There are some new books in the list of books available for review. Some reviewers have not finished their reviews yet, I will start sending individual letters soon.

While adding the new entries to the calendar this quarter, I noticed that a lot of the conferences (or workshops) were the "Second ..." This must indicate that the first was successful, and maybe these more specialized meeting will grow into important specialized conferences.

This is the second issue with the new cover format; we can change the cover to include a logo if one is created. Also the local groups are listed in the inside back cover. The information about each local will be reduced as the number increases so that they can all fit on one page (until they need even more space). This issue is the first for the new **Locals Information** Column by David Dietz (see his column on this page for his address). The first edition is a note about the Dayton Local (which he knows the most about); he will have more information from more locals in the future issues. Several of the locals are very active (I know this from information I have received from them) and all provide a good way to increase the interaction between various researchers and users in local areas. Ron Brachman is coordinating the formation and development of Sigart locals; contact him for more information.

There was a cartoon in **Science** that said:

> It's beginning to show some human charistics - faulty reasoning, forgetfulness and repetition.

This month I received a report on AI in Australia with a complete listing of people and their areas of interest. This is an annual report produced by AIIA, which has doubled in size since 1985.

Also this fall, the SIGSOFT newsletter (SEN) had a long note about risks to the public from computer systems. Peter Neumann (the SIGSOFT editor) commented on a paper by Herb Simon with the title Whether Software Engineering Needs to Be Artificially Intelligent by proposing a paper Whether Artificial Intelligence Needs to Be Software Engineered. He comments, "... I hope that developers of real-world AI systems, particularly systems for use in critical environments, will take software engineering more seriously."

Keith Price
December 29, 1986

Nominating Committee Report

The SIGART Nominating Committee has put together the following slate of candidates for the Spring, 1987 election:

Chair:	Eugene Charniak, Brown University Paul Rosenbloom, Stanford University
Vice-Chair:	Cathy McCoy, University of Delaware Ramesh Patil, University of Michigan
Sec.-Treas.:	Lewis Johnson, USC-ISI David Touretzky, Carnegie-Mellon Univ.

Candidates can also be nominated by petition. SIG members wishing to petition must inform ACM Headquarters (Pat Ryan), the SIGART Area Director (Barbara Wolfe), and the SIGART Secretary (Kathy McKeown) of their intention by March 15, 1987. Petitions must be submitted to ACM Headquarters by April 15, 1987.

SIGART Locals Information

With this issue of the SIGART Newsletter, we begin a new column dedicated to news about SIGART Locals. Please send information concerning your local SIGART to

David C. Dietz
Systems Research Labs
2800 Indian Ripple Road
Dayton, Ohio 45440
(513) 426-6000

Greater Dayton SIGART

The Dayton, Ohio SIGART currently has 250 members and holds a monthly meeting with a presentation on various AI topics. We annually hold a four day conference on AI applications. The third annual conference will be devoted to Aerospace and Commercial Applications of Artificial Intelligence. For further information please contact:

David C. Dietz
Greater Dayton SIGART
PO Box 31434
Dayton, Ohio 45431
(513) 426-6000

Books Available for Review

The following books are available for review. If you are interested send your request to the editor (include alternate books if available, the number is for my internal reference, but you may use it in your letter). You will receive a copy of the book with the expectation that you will prepare a review for a future issue. The review should focus on content and usefulness for researchers, teachers, and others interested in various aspects of AI.

1. **Combinatorics**, B. Bollobas, Cambridge. (43)
2. **Annual Review of Computer Science**, Traub, et al. (eds), Annual Reviews. (42)
3. **Readings in AI and Software Engineering**, Rich and Waters (eds), Morgan Kaufmann. (41)
4. **Readings in natural Language Processing**, B. Grosz, et al. (eds), Morgan Kaufmann. (40)
5. **Expert Systems 1986, An Assessment of Technology and Applications**, Walker and Miller, SEAI Tech. Pubs. (39)
6. **Molecular Electronics: Beyond the Silicon Chip**, M. Jarvis, SEAI Tech Pubs. (38)
7. **Advanced Database Techniques**, D. Martin, MIT Press. (37)
8. **A Programmer's Guide to Common Lisp**, D. G. Tatar, Digital Press. (36)
9. **Two Issues in Public Key Cryptography**, Ben-Zion Chor, MIT Press. (34)
10. **A Natural Language Interface for Computer-Aided Design**, T. Samad, Kluwer. (31)
11. **Motion: Representation and Perception**, N.I. Badler and J.K. Tsotsos (Eds.), North-Holland (ACM Conference). (33)
12. **Theoretical Aspects of Reasoning about Knowledge**, Proceedings of the 1986 Conference, J.Y. Halpern (Ed.), Morgan Kaufmann. (28)

CALENDAR OF EVENTS

SIGART CALENDAR

AI Related Conferences and Paper Deadlines of the Recent Past and Future

December 15, 1986 - Paper deadline. ICCV-87. See Sigart #97.

December 15-18, 1986 - Expert Systems 86, Brighton, UK. See Sigart #96.

January 5, 1987 - Paper deadline. IJCAI-87. See Sigart #97.

January 7-9, 1987 - TINLAP3, Las Cruces, New Mexico. See Sigart #98.

January 20-22, 1987 - Workshop on Space Telerobotics, Pasadena, CA. See Sigart #98.

February 14-16, 1987 - BLS 13, Berekeley, CA. See this issue.

February 17-20, 1987 - IFIP Working Conference on Expert Systems, Sydney, Australia. See Sigart #96.

March 9, 1987 - Expert Systems in Telecommuications, New York. See this issue.

March 22-26, 1987 - NCGA Computer Graphics '87, Philadelphia, PA.

March 23-25, 1987 - 6th Symposium on Principles of Database Systems, San Diego, CA. See Sigart #97.

April 1-3, 1987 - 3rd Conference of the European ACL, Copenhagen, Denmark. See Sigart #98.

April 5-9, 1987 - CHI'87 and GI'87, Toronto. See this issue.

April 6-10, 1987 - 2nd International Symposium on Knowledge Engineering, Madrid, SPAIN. See this issue.

April 6-10, 1987 - AISB-87, Univ. of Edinburgh. See Sigart #98.

May, 1987 - 4th International Conference on Logic Programming, Melbourne, Australia. See Sigart #98.

May 13-15, 1987 - Expert Systems and Their Applications, Avignon, France. See Sigart #98.

May 15-15, 1987 - 3rd Ausstralian Conference on Applications of Expert Systems, Sydney. See this issue.

May 25-27, 1987 - 2nd Intl. Conference on Rewriting Techniques and Applications, Bordeaux, France. See Sigart #98.

May 27-29, 1987 - 1st Intl. Conference on AI and Law, Northeastern Univ., Boston. See Sigart #98.

June 2-5, 1987 - International Symposium on Symbolic and Algebraic Computation, Leipzig, GDR. See this issue.

June 8-11, 1987 - ICCV-87, London, England. See Sigart #97.

June 15-17, 1987 - European Conference on Object Oriented Programming, Paris. See this issue.

June 21-24, 1987 - 1st Intl. Conference on Neural Networks, San Diego, CA. See this issue.

June 24-26, 1987 - NECC87, Philadelphia, PA. See Sigart #98.

June 29-August 7, 1987 - Stanford Liguistics Instituute. See Sigart #96.

July 6-9, 1987 - ACL Annual Meeting, Stanford, CA. See Sigart #98.

July 12-18, 1987 - AAAI-87, Seattle, WA.

July 27-31, 1987 - SIGGRAPH '87, Anaheim, CA.

August 4-7, 1987 - 2nd International Conference on Applications of AI in Engineering, Boston, MA. See Sigart #98.

August 10-15, 1987 - Human computre Interaction, Honolulu, HI. See Sigart #97.

August 17-20, 1987 - 2nd International Workshop on Natural Language Understanding and Logic Programming, Vancouver, BC. See this issue.

August 23-28, 1987 - IJCAI 87, Milan, Italy. See Sigart #97.

August 24-26, 1987 - International Workshop on Petri Nets, Madison WI. See this issue.

October 14-17, 1987 - 2nd International Symposium on Methodologies for Intelligent Systems, Charlotte, NC. See this issue.

August, 1988 - AAAI Minneapolis, MN.

For those who plan ahead

August 20-26, 1989 - IJCAI-89. Detroit, MI.

June 8-11, 1992 - NCC-92.

August 2-6, 1993 - SIGGRAPH '93, Anaheim, CA.

CALLS FOR PAPERS

THE BERKELEY LINGUISTICS SOCIETY BLS 13

The Berkeley Linguistics Society is pleased to announce its Thirteenth Annual Meeting, to be held February 14 - 16, 1987. The conference will consist of a General Session and a Parasession. Each of these will have a number of invited speakers.

GENERAL SESSION

The main session will cover areas of general linguistic interest. Invited speakers include:

DWIGHT BOLINGER, Harvard University (Emeritus)
JOHN GOLDSMITH, University of Chicago
PAUL HOPPER, SUNY-Buffalo
JOHN OHALA, University of California, Berkeley

PARASESSION ON GRAMMAR AND COGNITION

This year's parasession will examine the nature of human linguistic knowledge and its representation in linguistic, psycholinguistic, philosophical, and AI models. The relationship between linguistic cognition and other cognitive systems, and the correspondence between the linguist's constructs and the speaker's mental constructs, are among the possible topics. Invited speakers include:

ELISABETH BATES, University of California, San Diego
EVE V. & HERBERT H. CLARK, Stanford University
RAY JACKENDOFF, Brandeis University
MARTIN KAY, CSLI/Xerox PARC
DAVID RUMELHART, University of California, San Diego
DAN SLOBIN, University of California, Berkeley

Speakers will be allowed 20 minutes for presentation and 10 minutes for questions. Abstracts were due before November 16, 1986. For information contact:

Laura A. Michaelis
Berkeley Linguistics Society
2337 Dwinelle Hall
University of California
Berkeley, CA 94720

FIRST ANNUAL INTERNATIONAL CONFERENCE ON NEURAL NETWORKS

San Diego, California
21-24 June 1987

The San Diego IEEE Section welcomes neural network enthusiasts in industry, academia, and government worldwide to participate in the inaugural annual ICNN conference in San Diego.

Papers are solicited on the following topics:

Network Architectures	Electrical Neurocomputers
Learning Algorithms	Optical Neurocomputers
Self- Organization	Knowledge Processing
Adaptive Resonance	Vision
Dynamical Network Stability	Speech
Connections:	Recognition and Synthesis
Neurobiological	Robotics
Cognitive Science	Novel Applications

Contributed Papers: Extended Abstract should be submitted by 1 February 1987 for Conference Presentation. The Abstract must be single spaced, three to four pages on 8.5 x 11 inch paper with 1.5 inch margins. Abstracts will be carefully refereed. Accepted abstracts will be distributed at the conference. Final Papers due 1 June 1986.

FINAL RELEASE OF ABSTRACTS AND PAPERS WITH RESPECT TO PROPRIETARY RIGHTS AND CLASSIFICATION MUST BE OBTAINED BEFORE SUBMITTAL.

Address all Corresspondence to:
Maureen Caudill
ICNN
10615G Tierrasanta Blvd. Suite 346
San Diego, CA 92124

Registration Fee: $350 if received by 1 December 1986, $450 thereafter.

Conference Venue: Sheraton Harbor Island Hotel (approx. $95 - single), space limited, phone (619) 291-6400. Other lodging within 10 minutes.

Tutorials and Exhibits: Several Tutorials are Planned. Vendor Exhibit Space Available - make reservations early.

Conference Chairman: Stephen Grossberg

International Chairman: Teuvo Kohonen

Organizing Committee: Kunihiko Fukushima, Clark Guest, Robert Hecht-Nielsen, Morris Hirsch, Bart Kosko (Chairman 619-457-5550), Bernard Widrow.

The Third Australian Conference on Applications of Expert Systems

Sydney, 13-15 May 1987

The Sydney Expert Systems Group has organised two successful conferences on this theme, including keynote addresses from internationally-recognised authorities Bruce Buchanan (Stanford University), Donald Michie (Turing Institute), Neil Pundit (Digital Equipment Corporation, USA), Donald Waterman (Rand Corporation) and Patrick Winston (M.I.T.). The 1987 conference will continue this tradition, with addresses from distinguished overseas speakers and Australian experts.

Papers are invited on any aspect of expert systems technology, including

* examples of expert systems that have been developed for particular applications
* design and evaluation of tools for building expert systems
* knowledge engineering methodology
* specialised hardware for expert systems

Contributions that discuss the authors' experiences/successes/ lessons learned in building expert systems will be particularly welcome. Papers of any size will be considered but a length of 15-30 pages is recommended. All accepted papers will be published in the Proceedings.

Authors should note the following dates:

Deadline for papers:	30th January 1987
Notification of acceptance:	13th March 1987
Deadline for camera-ready copy:	10th April 1987
Presentation of paper:	13-15th May 1987

Papers should be sent to the Program Chairman,
Dr J. R. Quinlan
School of Computing Sciences
NSW Institute of Technology
Broadway NSW 2007
Australia

Requests for registration forms should be sent to "ES Conference Registrations, c/o Dr John Debenham" at the above address.

EUROPEAN CONFERENCE ON OBJECT ORIENTED PROGRAMMING

Paris, France: June 15-17 1987

Following the AFCET group's three previous Working Sessions on Object Oriented Languages next encounter will take place at the Centre Georges Pompidou (Paris) on June 15th, 16th & 17th 1987. With regard to the success of the previous workshops and to the increasing interest on the subject, the next meeting will be an international conference organized by AFCET. The program committee is:

G. Attardi, DELPHI, Italy
J. Bezivin, LIB (UBO & ENSTbr), France
P. Cointe, CMI & LITP, France
S. Cook, London University, England
J.M. Hullot, INRIA, France
B. Kristensen, Aalborg University Center, Denmark
H. Lieberman, MIT, USA
L. Steels, Brussels University, Belgium
H. Stoyan, Konstanz University, West German
B. Stroustrup, AT&T Bell Labs, USA
J. Vaucher, Montreal University, Canada
A. Yonezawa, Tokyo Institut of Technology, Japan

The conference will consist of a presentation of selected papers. Well-known researchers having made major contributions in the field - like C. Hewitt and K. Nygaard - will also give invited lectures.

This new conference will deal with all domains using the techniques and methodologies of Object Oriented Programming. It is likely to interest both software designers and users. Proposed themes are the following:

* Theory : semantic models (instantiation, inheritance), compilation
* Conception : new languages, new hardwares, new extensions of languages Applications : man/machine interfaces, simulation, knowledge representation, data bases, operating systems
* Methodology : Smalltalk-80 methodology, actor methodology, frame methodology, the abstract type approach
* Development : industrial applications.

The papers must be submitted in English and should not be longer than ten pages. Five copies must be received at one of the address below, no later than January 9th,1987 (and, if possible, by electronic mails to the conference co-chairmen). Papers selection will be done by circulating papers to members of the program committee having appropriate expertise. Authors will be notified of acceptance by February, 15th 1987. To be included in the Proceedings the definitive version of the paper must reach the AFCET office before April, 27th 1987.

Conference Co-chairmen
J.M. Hullot (INRIA)
mcvax!inria!hullot
J. Bezivin (LIB)
mcvax!inria!geocub!bezivin

Program Co-chairmen
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mcvax!inria!cointe
H. Lieberman (MIT)
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USA Coordinator
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(201 582 7393)

Organization
Claire Van Hieu
AFCET
156 Boulevard Pereire
75017 Paris, France
(1) 47.66.24.19

Following the conference - and in the same place - Jerome Chailloux and Christian Queinnec will organize on June 18th and 19th a workshop about Lisp and its standardization. People interested in Tutorials, Workshops or Exhibitions may contact the AFCET organization.

SECOND INTERNATIONAL WORKSHOP on NATURAL LANGUAGE UNDERSTANDING AND LOGIC PROGRAMMING

Vancouver, B.C.,
August 17-20, 1987

The workshop will consider fundamental principles and important innovations in the design, definition, uses and extensions of logic programming to natural language understanding and, conversely, the adequacy of logic programming to express natural language formalisms. The main topics of interest are:

* Logic grammar formalisms,
* Formal representations of natural language sentences and texts,
* Resolution methods for specific aspects such as: anaphoras, coordination,
* Natural language generation.
* Uses of techniques for logic grammars (unification) in other grammar formalisms,
* Compilers and interpreters for grammar formalisms,
* Applications: natural language front-ends.

DEADLINES:

* March 15, Submission of papers in final form.
* June 1, Notification of acceptance to authors.
* August 17-19, Workshop, Final paper due to be published in a book.

SUBMISSION OF PAPERS

Papers should contain the following items: title, name and address of author(s), affiliation, mailing address and phone (or telex) number and one program area. Papers must relate recent and unpublished work.

Please, send 4 copies of a 8-12 page, single space typed manuscript, including a 150-200 words abstract to:

Patrick Saint-Dizier
Department of Computing Science
Simon Fraser University
BURNABY, B.C.
V5A 1S6 Canada

SECOND INTERNATIONAL SYMPOSIUM ON KNOWLEDGE ENGINEERING

MADRID
April 1987
Department of Computer Sciences,
Polytechnical University of Madrid.
With the collaboration of RANK XEROX ESPANOLA, S.A.
(Facultad de Informatica)

The Second International Symposium on Knowledge Engineering, organized by the Department of Computer Sciences of the Polytechnical University of Madrid, aims to promote the analysis and exchange of ideas, in the broadest possible perspective, by and among scientists and workers interested in this field of science. Specifically concerning its relations with the Software Engineering.

The scientific community in general, and computer sciences specialists in particular are therefore invited to present their views as communications to the Symposium on the following subjects:

* Artificial Intelligence and Software Engineering.
* Automatic Programming.
* Knowledge Based Systems (Expert Systems):
  - Knowledge representation.
  - Learning and Knowledge acquisition.
* New tools for Electronic Office: Intelligent interfaces.

Requirements for Submission

Authors should submit 4 complete copies of their paper. Maximum 7,000 words, approximately 10 proceedings pages.

Each paper will be deeply reviewed by experts in the topic area specified. Acceptance will be based on originally and significance of the reported research, as well as the quality of its presentation. Applications clearly demonstrating the power of established techniques, as well as thoughtful critiques of previous material will be considered, provided that they point the way to new research and are substantive scientific contributions in their own right.

In order to ensure appropriate refereeing, authors are requested to specify to which of the above topic areas the paper belongs, as well as a set of no more than 6 keywords for further classification within that topic area. Because of time constraints, papers requiring major revisions cannot be accepted.

Details for Submission The following information must be included with each paper:

* Author's name, address, telephone number and net-mail address (if applicable).
* Topic area (plus a set of no more than 6 keywords for further classification within the topic area).
* An abstract of 100/200 words.
* Paper length (in words).

The time-table is as Follows:

Submission deadline: 31 January, 1987 (papers recieved after 31 January 1987, will be returned unopened).

Notification of Acceptance: 15 February, 1987.

Camera ready copy due: 10 March, 1987.

Contact Points

Submission should be sent to:
Prof. Juan Pazos-Sierra,
Vicedecano Facultad de Informatica,
Universidad Politecnica de Madrid,
Km. 7 Carretera de Valencia,
28031 Madrid (Spain).
EARN-BITNET: C1099001 @EMDUPM11

General enquiries should be directed to:
D. Jose R. Chelala,
Alverez de Baena, 3 - 2.
28006 Madrid (Spain).
Telephone: (91) 419 7538, 261 4266

TIME-TABLE

Tutorials 6-7 April, 1987. Morning and evening.

Lectures 8,9, and 10 April, 1987.

Panels and Invited Talks 8,9, and 10 April, 1987. Presentation of papers by the selected experts.

Permanent exhibition of the communications received.

SELECTION OF COMMUNICATIONS

The Programme Committee will study all the communications received and will select those of higher interest to be presented and discussed, that will be included in the publication to be edited with the conclusions of the Symposium.

INTERNATIONAL WORKSHOP ON PETRI NETS AND PERFORMANCE MODELS

Madison, Wisconsin, USA
August 24-26, 1987

The aim of the workshop is to bring together scientists who are involved in the development and use of graphical models based upon Petri Nets to evaluate the performance of computer, communication, industrial, and other systems.

TOPICS INCLUDE:

* Theoretical aspects of Petri Nets with deterministic and/or stochastic timing.
* Applications of Petri Net models to system design and performance analysis in the fields of Computer Science, Telecommunications, Reliability, Manufacturing Engineer- ing, and others.
* Tools for the automated analysis of Petri Net performance models.
* New or extended graphical models which are useful for system performance evaluation.

INSTRUCTIONS: Authors should submit six (6) copies of a full paper to Michael K. Molloy, Department of Computer Science, 4212 Wean Hall, Carnegie-Mellon University, Pittsburgh, PA, 15213, USA, by January 2, 1987. Papers should be no longer than 20 typewritten (double spaced) pages in length, including figures and tables. The Author(s) Name(s) and Affiliation(s) should appear on the cover sheet.

IMPORTANT DATES

January 2, 1987 Deadline for paper submission
April 15, 1987 Notification of acceptance
June 1, 1987 Final version due
July 15, 1987 Deadline for advanced registration

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C. Smith, USA

SPECIAL COMBINED CONFERENCE on HUMAN FACTORS IN COMPUTING SYSTEMS (CHI'87) and GRAPHICS INTERFACE (GI '87)

Toronto Hilton Harbour Castle
Toronto, Ontario Canada
April 5 - 9, 1987

Co-sponsored by the ACM Special Interest Group on Computer and Human Interaction (ACM/SIGCHI) and the Canadian Information Processing Society's (CIPS) special interest group, the Canadian Man-Computer Communications Society (CMCCS), in cooperation with the Human Factors Society and ACM/SIGGRAPH.

For information contact:
Wendy Walker
Conference Coordinator
CHI + GI '87 Conference Office
Computer Systems Research Institute
University of Toronto
10 Kings College Road, Room 2002
Toronto, Ontario
CANADA M5S 1A4
Telephone: 416-978-5184 or
Electronic mail: WWalker.CHI@Xerox.Com

EUROPEAN CONFERENCE ON COMPUTER ALGEBRA 1987 INTERNATIONAL SYMPOSIUM ON SYMBOLIC AND ALGEBRAIC COMPUTATION

LEIPZIG, GDR
June 2 - 5, 1987

This is the annual European conference on symbolic and algebraic computation held under the patronage of SAME (Symbolic and Algebraic Manipulation in Europe).

The conference will take place at the Karl Marx University in the well known conference town of Leipzig, GDR under the chairmanship of Wolfgang Lassner.

Main topics of the conference are:
* Symbolic, Algebraic and Analytic Algorithms
* Automated Theorem Proving, Automatic Programming
* Computational Geometry
* Languages and Systems for Symbolic Computation
* Applications of Symbolic Computation to Science, Engineering and Education

The conference will feature
* invited lectures
* original research in the form of full papers
* short reports as extended abstracts
* informal reports in poster sessions
* demonstrations of hardware and software systems

Four copies of papers should be sent to the Chairman of the Program Committee so as to reach him by January 15, 1987. It is expected that the Proceedings will be published in Springer-Verlag. Three types of papers and presentations will be made at the conference: (i) full-length research papers, (ii) extended abstracts and (iii) poster sessions. Research papers should be not more than 12 double-spaced pages, and should contain a one-page abstract explaining clearly what is new about the research described in the paper. These abstracts will be published in the SIGSAM Bulletin for distribution at the conference. Extended abstracts about research results are limited to two pages, will be published in the Proceedings, and must conform to the standards for published papers including proper references to the literature. Such abstracts should be summaries of high quality paper that have been recently published elsewhere. Poster sessions will be held for informal reports about on-going research and projects. These will not be included in the Proceedings.

Papers will be reviewed by members of the Program Committee and external referees as necessary. Final versions for publication must be brought to the conference. Authors are encouraged to state electronic mail or telex addresses on their submissions.

In addition, the Committee will welcome proposals for survey talks and tutorials, and especially for demos of hardware and software systems. Such proposals should reach the Program Committee Chairman as soon as possible.

Conference Chairman
Wolfgang Lassner
Mathematics Section
Karl-Marx-University
Leipzig 7010

German Democratic Republic
Phone (+37)-41-719-2476 Telex: 051350
(also chairman of Local Organizing Committee)

PROGRAM COMMITTEE

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University of Beth,
Beth BA2 7AY,
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The Program Committee is currently being completed.

DATES

January 18, 1987 Papers due on Beth
April 1, 1987 Acceptance Decisions posted
June 2-5, 1987 Conference

SECOND INTERNATIONAL SYMPOSIUM ON METHODOLOGIES FOR INTELLIGENT SYSTEMS

Charlotte, North Carolina
Hilton Hotel at University Place
October 14-17, 1987

SPONSORS

* UNC-Charlotte
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This symposium is intended to attract individuals who are actively engaged both in theoretical and practical aspects of intelligent systems. The goal is to provide a platform for a useful exchange between theoreticians and practitioners, and to foster the cross-fertilization of ideas in the following areas: Expert systems, knowledge Representation, Logic for Artificial intelligence, Learning and Adaptive Systems, Intelligent Databases, Approximate Reason- ing, Intelligent Systems for Software Development.

Proceedings will be published.

DATES:
Submission by March 15,
Notification by May 15,
Camera-ready copy by June 15.
Send 5 copies of a paper to:
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The International Journal of Expert Systems: Research and Applications seeks high quality original research and survey papers on all aspects of expert systems and related subjects. Papers may deal with theoretical issues or practical aspects of topics such as: knowledge engineering, ES construction tools & environments, multi-expert & multidomain knowledge integration, meta-knowledge, inference engines & logic programming or functional programming, uncertain or vague reasoning (fuzzy reasoning, multi-valued logic), nonmonotonic reasoning (default reasoning, autoepistemic reasoning), natural-language processing, expert database systems, computational cognitive models, inductive reasoning, reasoning by analogy, machine learning, explanation & tutoring, planning & metaplanning, expertise on multimedia support, analogical representation, ES, and simulation, man-machine interaction for ES, ES & software engineering, reasoning about temporal events, ES for machine vision & pattern recognition, performance analysis of ES, heuristic programming & knowledge-compilation, automated programming, qualitative reasoning, intelligent computer-assisted instruction, neural-net related models, computational cognitive theories, or any other related topic.

The journal will also publish papers which address novel applications of expert systems in medicine, engineering and manufacturing, robotics and simulation, CAD/CAM, chemistry, cartography, geology, communication, configuration management, civil engineering, natural sciences, agriculture, humanities, law, process control, computer assisted instruction, or any other domain of application.

Please submit five copies of complete manuscript to:
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1304 West Springfield Avenue
Urbana, Illinois 61801, U.S.A.

The Communications Technical Group And The Metropolitan Chapter of The Human Factors Society

SYMPOSIUM
EXPERT SYSTEMS IN TELECOMMUNICATIONS
March 9, 1987
New York City

Expert Systems in Telecommunications, jointly sponsored by the Communications Technical Group and the Metropolitan Chapter of the Human Factors Society, will examine recent advances in the application of expert system technology to the telecommunications industry. The Symposium will focus on those activities in the industry that can be improved dramatically by the use of AI/expert techniques. A wide range of topics within this arena will be addressed, such as network design, management, and maintenance, as well as the user interfaces to these systems.

The increasing complexity of large networks has placed severe demands on the people who plan, build, and maintain them. Automated systems, and especially expert systems, are being developed to help people run large networks. Many of these systems are still in their prototype stages, and a number of companies are pursuing them. Examining these systems is both necessary and timely.

The Symposium explores expert systems in telecommunications, addressing issues of application domain, interface design, operator control, and training. A preliminary list of some of the invited speakers includes:

John Thomas NYNEX
Richard Peacock Bell Northern
Timothy Ahlstrom Avant Garde
Gregory Vesonder AT&T Bell Labs

The Symposium will be held in the Theatre in the Gallery of the IBM Building, 590 Madison Avenue, New York City. Pre-registration material will be mailed January 15, 1987.

Pre-registration information can be obtained from:

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IBM-E04/664
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International Journal of Computer Vision

The new INTERNATIONAL JOURNAL OF COMPUTER VISION is being published to provide a forum for the dissemination of new research results in the rapidly growing field of computer vision. A quarterly, the first issue will appear in 1987.

The Journal will publish high quality, original papers contributing to the science of computer vision, including:

* Computational aspects of vision:
  - vision algorithms
  - systems
  - artificial intelligence approaches
  - computer architectures for vision

* Applications of vision with special emphasis on robotics and photo interpretation

Academic and industrial researchers in the area of computer vision, robotics and AI, as well as academic psychologists studying the psychology of human vision, will find this new forum to be the journal of choice for publication of significant contributions to the science of computer vision.

Authors are encouraged to submit high quality, original works which have not appeared, nor are under consideration, in other journals. Papers which have previously appeared in conference proceedings will also be considered, and this should so be indicated at the time of submission.

Authors should submit four hard copies of their final manuscript to either one of the editors at the following addresses:

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International Journal of Pattern Recognition and Artificial Intelligence

A new International Journal of Pattern Recognition and Artificial Intelligence is being established by the World Scientific Publications Company, PTE. LTD. As an editor in charge, my main responsibility is to solicit good papers and maintain the high quality of the journal. The first issue is scheduled to come out some time around December, 1986, as a special issue in memory of the late Professor K.S. Fu.

I encourage you, especially those who research interests fall into AI, pattern recognition, expert systems, knowledge engineering, image processing, computer vision, natural language processing, robotics or related areas, to submit your paper. If you are interested, please contact me as soon as possible. I'll be glad to assist you with my best capability. Your attention to this is greatly appreciated.

Patrick S. Wang, Ph.D.
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Editor-in-charge, IJPRAI
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Graduate School
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The Turing Institute Abstracts in Artificial Intelligence

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Applied Artificial Intelligence an International Journal

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AI technology has emerged as the bright spot of the computer industry. Investors have been flocking to become a part of it as sales of AI technology registered more than a 60% increase from 1984 to 1985. This year, some 150 companies have spent over $1 billion for in-house AI groups.

Just four years ago only a few journals covered AI. Today, that numbers has reached two figures. You can imagine how many more books there are today - compared to less than 60 titles then. And the largest professional AI society in the United States, only seven years old, now has nearly 4,000 members and three regular publications.

For as many areas as AI shows promise, this publica-

tion spotlights advances in:

* uses of expert systems, natural language systems, speech, vision, robotics; all used for solving tasks in management, industry, engineering, administration, and education.
* evaluations of existing AI systems and tools, emphasizing comparative studies and users experiences.
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Journal of Logic Programming: APPLICATIONS OF LOGIC PROGRAMMING FOR KNOWLEDGE BASED SYSTEMS

The papers should describe applications which exploit special features of logic programming, for example a problem solved by using a logic programming language where the solution would be more difficult to state in another language, or the development of a methodology for the more effective use of logic programs. The reported research should be original and should not have appeared elsewhere. Updates of successful, ongoing projects containing material not otherwise available will also be considered.

Applications of interest include, but are not limited to:

Financial expert systems
Diagnosis systems
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Expert systems tools
VLSI design
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Please send 4 copies of your paper by May 31, 1987 to:

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IEEE EXPERT
Special Issue - Fall 1987
AI Applications in Financial Expert Systems

The Fall 1987 issue of IEEE EXPERT will be devoted to papers that discuss the technical requirements imposed upon AI techniques for building intelligent systems for financial applications and the methodologies employed for the construction of such systems.

REQUIREMENTS FOR SUBMISSION OF PAPERS

Authors should submit their papers to the guest editors no later than **April 1, 1987.** Each submission should include one cover page and five copies of the complete manuscript. The one cover page should include Name(s), affiliation(s), complete address(es), identification of principal author and telephone number. The five copies of the complete manuscript should each include:

- Title and abstract page: title of paper, 100 word abstract indicating significance of contribution.
- The complete text of the paper in English, including illustrations and references, not exceeding 5000 words.

TOPICS OF INTEREST

Authors are invited to submit original technical papers describing recent and novel applications of AI techniques to the research and development of financial expert systems. Topics include, but not limited to:

1. Automated Reasoning
2. Knowledge Representations
3. Inference Techniques
4. Problem-Solving Control Mechanisms
5. Natural Language Front-Ends
6. User-Modeling
7. Explanation Methodologies
8. Knowledge Base Debugging, Validation and Maintenance
9. System Issues in Development and Deployment

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REPORTS

SUNY AT BUFFALO DEPARTMENT OF COMPUTER SCIENCE GRADUATE STUDENT OPEN HOUSE

William J. Rapaport
Dept. of Computer Science
SUNY Buffalo

On March 20, 1986, graduate students of the SUNY Buffalo Department of Computer Science presented an all-day conference on their recent research, most of which is on AI. Approximately 150 people attended, including delegations from area universities, colleges, and industry. The conference was entirely the idea of the graduate students and was organized and run entirely by them. I might add that it was the most flawless conference I have been to.

Presented here are short abstracts of the talks. A technical report with extended abstracts is available; for further information, contact James Geller (geller%buffalo@csnet-relay), the organizer of the conference.

ABSTRACTS OF TALKS

A THEORY OF HYPOTHESIS GENERATION IN VISUAL WORD RECOGNITION
JON HULL

An algorithm is presented that generates hypotheses about the identity of a word of text from its image. This algorithm is part of an effort to develop techniques for reading images of text that possess the human capability to adapt to variations in fonts, scripts, etc. This methodology is being pursued by using knowledge about the human reading process to direct the development of algorithms for reading text. The algorithm discussed in this talk locates a set of hypotheses about the identity of an input word (called the neighborhood of the input word).

Results are reported in this talk on the size of neighborhoods for words printed in lower case that are drawn from a large text. Several statistical measures are computed from subsets of a text of over 1,000,000 words and their corresponding dictionaries. These results show that the average neighborhood in the dictionary of the entire text contains only 2.5 words. The feasibilty of this method is also shown by experimentation with a database of lower case word images. The application of this approach to 8700 word images taken from 29 different fonts, in three conditions of noise, shows that the correct neighborhood is determined in 80% to 100% of all cases.

DATABASES THAT REFUSE TO ANSWER QUERIES
GEORGE SICHERMAN

Question-answering systems must often keep certain information secret. One way they can do this is by refusing to answer some queries. But if the user may be able to deduce information from the system's refusal to answer, the secrecy of the information is broken.

In this talk, I present a categorization of answer-refusing systems according to what they know, what the user knows, and when the system refuses to answer. I also give two formal results about when the user can deduce secrets from the system's refusals to answer, depending on how much she knows about the system.

UNDERSTANDING DE RE AND DE DICTO BELIEF REPORTS IN DISCOURSE AND NARRATIVE
JANYCE WIEBE

Belief reports can be interpreted "de re" or "de dicto", and we investigate the disambiguation of belief reports as they appear in discourse and narrative. In earlier work by Rapaport and Shapiro, representations for "de re" and "de dicto" belief reports were presented, and the distinction between them was made solely on the basis of their representations. This analysis is sufficient only when belief reports are considered in isolation. We need to consider more complicated belief structures in order to sufficiently represent "de re" and "de dicto" belief reports as they appear in discourse and narrative. Further, we cannot meaningfully apply one, but not the other, of the concepts "de re" and "de dicto" to these more complicated belief structures. We argue that the concepts "de re" and "de dicto" apply not to an agent's conceptual representation of her beliefs, but to the utterance of a belief report on a specific occasion. A cognitive agent interprets a belief report such as "S believes that N is F", or "S said, 'N is F'" (where S and N are names or descriptions, and F is an adjective) "de dicto" if she interprets it from N's perspective, and "de re" if from her own.

DEVICE REPRESENTATION USING INSTANTIATION RULES AND STRUCTURAL TEMPLATES
MINGRUEY TAIE

A device representation scheme for automatic electronic device fault diagnosis is described. Structural and functional descriptions of devices (which are central to design-model-based fault diagnosis) are represented as instantiation rules and structural templates in a semantic network. Device structure is represented hierarchically to reflect the design model of most devices in the domain. Each object of the device hierarchy has the form of a module. Instead of representing all objects explicitly, an expandable component library is maintained, and objects

are instantiated only when needed. The component library consists of descriptions of component "types" used to construct devices at all hierarchical levels. Each component "type" is represented as an instantiation rule and a structural template. The instantiation rule is used to instantiate an object of the component "type" as a module with I/O ports and associated functional descriptions. Functional description is represented as procedural attachments to the semantic network; this allows the simulation of the behavior of objects. Structural templates describe sub-parts and wire connections at the next lower hierarchical level of the component "type." Advantages of the representation scheme are compactness and reasoning efficiency.

TOWARDS A THEORY OF VISUAL REASONING
JAMES GELLER

Visual Knowledge Representation has not yet found the treatment it deserves as its own subfield of AI. Visual reasoning is fundamentally different from predicate calculus type logical reasoning and is of central importance for the field of Visual Knowledge Representation. A systematization of different types of visual reasoning requires the differentiation between purely geometrical reasoning and different types of knowledge-based reasoning. Knowledge-based reasoning in turn can use knowledge about the world, knowledge about abstract hierarchies, or knowledge about normality. Research on visual knowledge is directly applicable to graphics interface design for intelligent systems. The VMES maintenance expert system for circuit board repair uses such a user interface which is designed in analogy to a language generation program.

THE TEMPORAL STRUCTURE OF NARRATIVES
MICHAEL ALMEIDA

Narratives are a type of discourse used to describe sequences of events. In order to understand a narrative, a reader must be able to extract the "story," that is, the described events and the temporal relations which hold between them, from the text. Our principle research goal has been to develop a system which can read a narrative and produce a model of the temporal structure of its story.

The principle heuristic used in constructing such a model is the Narrative Convention: unless we are given some signal to the contrary, we assume that the events of the story occurred in the order in which they are presented in the text. In addition, however, a reader must deal with: (1) tense--in a standard past tense narrative the principle distinction is between the past and the past perfect tenses, (2) aspect--the distinction between events viewed perfectively or imperfectively, (3) aspectual class--the intrinsic temporal properties of various types of events, (4) time adverbials--these can be used to place events within various calendrical intervals, give their durations, or relate them directly to other events, and to some extent (5) world- knowledge.

A UNIFORM KNOWLEDGE REPRESENTATION FOR INTELLIGENT CAI SYSTEMS
WEI-HSING WANG

In examining the current situation of Computer Aided Instruction (CAI), we find that Intelligent CAI (ICAI) and its authoring system are necessary. By studying the knowledge representation methods and expert system concepts, we choose a frame representation method to construct an Intelligent Tutor, called ITES. We show that a frame can be used to represent knowledge in semantic nets, procedures and production rules. Furthermore, this method is very convenient in authoring system creation.

SEMANTICS FOR ABSTRACT DATA TYPES
RICK LIVELY

An abstract data type is often defined as a pair <A, S>, where A is a set (of objects) and S is a set of operations defined on cartesian products of the types of the objects. Axiomatic methods are used to develop specifications for the defined data type.

Semantics for abstract data types have been treated by Adj using initial algebras, and by Janssen (inspired by Montague semantics) using many- sorted algebras. A comparison is made of the mathematical properties and applicability to computer science of these approaches.

USING BELIEF REVISION TO DETECT FAULTS IN CIRCUITS
SCOTT CAMPBELL

To detect faults in electrical circuits, programs must be able to reason about whether the observed inputs and outputs are consistent with the desired function of the circuit. The SNePS Belief Revision System (SNeBR) is designed to reason about the consistency of rules and hypotheses defined within a particular context or belief space. This paper shows how belief revision can be used for fault detection in circuits, and so leads to a unification of the fields of belief revision (also known as truth maintenance) and fault detection.

DUNE: A Demon Based Expert System Architecture for Complex and Incompletely Defined Domains
DOUGLAS H. MacFADDEN

Traditional expert system architectures use the rule (an "if...then" data structure) as the primary unit of knowledge. The primary unit of knowledge in the DUNE system architecture is the demon. Each DUNE demon is an individual processing element that can contain a variety of types of data and can perform a variety of operations on its data. Each demon can communicate with any other demon or with the user via messages. Typical data for these demons may be a traditional type rule, a list of weight values for the features in the left-hand-side of the rule, an (English) description of each feature, a list of related demons, etc.

Typical operations that these demons may perform are: calculating the "closeness" of the rule to firing, calculating the most important feature of the rule yet to be resolved, telling the system to not consider this demon any more (entering a sleep state), telling other demons (and the user) that the demon is either satisfied or will never be satisfied, etc.

We hope to show that these features of DUNE demons can be exploited to express the knowledge of many expert domains that have proven unfeasible to traditional expert system architectures.

Understanding Time and Space in Narrative Text

JOYCE DANIELS
Department of Psychology

The Graduate Group in Cognitive Science at SUNY at Buffalo is an interdisciplinary group of faculty and graduate students. Participants in the group's activities come from over seventeen departments within the university and local colleges in Western New York and Canada. There are six core faculty and their graduate students, comprising a standing research group investigating how we understand movement through time and space in narrative text. This research addresses both the general issue of how time and space are expressed in language, and specific individual disciplinary interests such as identifying the exact lexical items signaling movement; developing experiments to collect data on the psychological validity of the supposed influence of suspected lexical items; examining the problems encountered by speech pathologists when a client cannot understand spatial or temporal concepts in language; and artificial intelligence program models of human and linguistic data on the SNePS network.

Research conducted by group members has resulted in the identification of what we term the "Deictic Center" (DC). This contains a WHO-point, a WHEN-point, and a WHERE-point. It is the locus of a particular point in conceptual space-time. We will explain the significance of the DC concept in greater detail and present some results of our linguistic and psychological investigation.

COMPUTING EDGE ORIENTATIONS IN IMAGES

BILL BAXTER

A method is described in which a set of oriented edge templates is used to detect intensity changes, or edges, in images. When a set of oriented templates is applied to an image, their respective outputs are usually combined, typically by choosing the maximum output at each location. The proposed alternative maintains the outputs of all the edge templates in a representation called orientation planes, in which the X and Y dimensions are identical with those in the image, and the Z axis represents the discrete orientations. Templates respond with graded outputs, depending on how well the input edge fits the template. Therefore, the representation of an edge in the orientation planes will consist of a set of responses across the Z axis, with the template output ranging from maximum to zero. Rather than choosing the template with the maximum output and assigning its orientation to the edge, orientations may be represented by the pattern of outputs across all the templates, i.e., across the orientation planes. It has been found that these patterns of outputs are a measure that is stable in the presence of noise and different edge amplitudes.

ARTICLES

AI: JUST HOW SCATTERED IS THE LITERATURE?
An online investigation

William J. Mills
Information Specialist: Physical and Electrical Sciences
Library and Information Services
Aston University
Birmingham, U.K.
14/10/86

It is a commonplace that the literature of AI is scattered. This paper presents evidence as to the extent of that scatter and explores some of the implications for how best to locate relevant literature.

DATABASE SCATTER

The availability of cross-file index searching capabilities on certain online host systems means that, for very little expense, it is possible to produce statistics on the comparative amount of literature relevant to a particular subject area held by large numbers of bibliographic databases. The survey described in this paper made use of the Dialindex and Questindex facilities on the Dialog and ESA-IRS host systems respectively. In all, 53 databases were investigated.

Table 1 lists the numbers of items identified in each database as matching the search statement "artificial intelligence or expert system/s." This statement was matched with titles and descriptors only so as to ensure a maximum degree of comparability. (To have searched abstracts also would have artificially inflated the totals of databases with long searchable abstracts, especially as against those whose abstracts could not be searched).

Table 1: DATABASE SCATTER
Situation in June 1986

Rank	No.	Database	Subject Coverage
1	5073	INSPEC(1971-)	General
2	2413	NTIS (1962-)	General
3	2267	Computer Database (1983-)	General
4	2058	NASA (1962-)	Space sciences
5	2034	EI MEETINGS (1979-)	Engineering
6	1936	MATHSCI(1973-)	Mathematics
7	1914	PASCAL (1973-)	General
8	1137	COMPENDEX (1969-)	Engineering
9	835	INFORMATION SCIENCE	As title
10	769	SCISEARCH (1974-)	General
11	531	ABI/INFORM (1970-)	Management
12	459	ERIC (1966-)	Education
13	421	SOCSCISEARCH (1972-)	Social science
14	403	Microcomputer Index (1981-)	As title
15	398	ROBOMATIX (1983-)	Robotics
16	379	ARTIFICIAL INTELLIGENCE	General
17	199	PSYCHINFO (1967-)	Psychology
18	186	ISMEC (1973-)	Mechanical eng.
19	123	EMBASE (1975-)	Medicine
20	121	DISSERTATIONS ABS. (1861-)	General

ABSTRACTS OF REPORTS

The following reports are available from:
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Experimental Goal Regression: A Method for Learning Problem Solving Heuristics
Bruce W. Porter and Dennis Kibler
January 1986.
AI86-20

GT: A Conjecture Generator for Graph Theory
Wing-Kwong Wong
January 1986.
AI86-21

An Intelligent Backtracking Algorithm for Parallel Execution of Logic Programs
Yow-Jian Lin Vipin Kumar and Clement Leung]
March 1986.
AI86-22

A Parallel Execution Scheme for Exploiting AND-parallelism of Logic Programs
Yow-Jian Lin and Vipin Kumar
March 1986.
AI86-23

Qualitative Simulation as Causal Explanation
Benjamin J. Kuipers
April 1986.
AI86-24

Fault Diagnosis Using Qualitative Simulation
Ray Bareiss and Adam Farquhar
April 1986.
AI86-25

Symmetric Rules for Translation of English and Chinese
Wanying Jin and Robert F. Simmons
May 1986.
AI86-26

Automatic Program Debugging for Intelligent Tutoring Systems
William R. Murray
June 1986. (PhD dissertation)
AI86-27

The Role of Inversion, Clecting and PP-Fronting in Relating Discourse Elements
Mark V. Lapolla
July 1986.
AI86-28

A Theory of Argument Coherence
Wing-Kwong C. Wong
July 1986.
AI86-29

Metaphorical Shift and the Induction of Similarities
Phillipe M. Alcouffe
July 1986. (Master's thesis)
AI86-30

A Rule Language for the GLISP Programming System
Christopher A. Rath
August 1986. (Master's thesis)
AI86-31

Talus: Automatic Program Debugging for Intelligent Tutoring Systems
William R. Murray
August 1986.
AI86-32

New Algorithms for Dependency-Directed Backtracking
Charles J. Petrie
September] 1986. (Master's thesis)
AI86-33

An Execution Model for Exploiting AND-Parallelism in Logic Programs
Yow-Jian Lin and Vipin Kumar
September 1986.
AI86-34

PROTOS: An Experiment in Knowledge Acquisition for Heuristic Classification Tasks
Bruce W. Porter and E. Ray Bareiss
August 1986.
AI86-35

A Sorting System Using Very Low Resolution Optical Sensor Array in Robot Fingertips

R. Q. Yang and M. W. Siegel

CMU-RI-TR-86-10, May 1986

A low-cost optical sensory sorting system is described. The sensor is directly mounted on robot gripper fingers, a light source on one and a coherent bundle of optical fibers on the opposing one. The optical fibers carry the shadow of a gripped object, as an eight-by-eight pixel array, to detection, multiplexing, discrimination, and computer interface electronics mounted on the robot base. The system uses a microcomputer for several data processing and pattern recognition functions. This discussion covers the design and analysis of the sensor and its optimal array, the hardware, and the parts recognition and control system. System performance in a demonstration task requiring the acquisition, identification, and sorting of a variety of electronic and mechanical parts is described. *(24 pages)*

Physically-Based Simulation Model for Acoustic Sensor Robot Navigation

Roman Kuc and M. W. Siegel

CMU-RI-TR-86-11, May 1986

A computer model is described that combines concepts from the fields of acoustics, linear system theory and digital signal processing to simulate an acoustic sensor navigation system using time-of-flight ranging. By separating the transmitter/receiver into separate components and assuming mirror-like reflectors, closed-form solutions for the reflections from corners, edges and walls are determined as a function of transducer size, location and orientation. A floor plan consisting of corners, walls and edges is efficiently encoded to indicate which of these elements contribute to a particular pulse-echo response. Sonar maps produced by transducers having different resonant frequencies and transmitted pulse waveforms can then be simulated efficiently. Examples of simulated sonar maps of two floor plans illustrate the performance of the model. Actual sonar maps are presented to verify the simulation results. *(32 pages)*

Kinematic Modeling of Wheeled Mobile Robots

Patrick F. Muir and Charles P. Neuman

CMU-RI-TR-86-12, June 1986

We formulate the *kinematic equations-of-motion* of wheeled mobile robots incorporating *conventional, omnidirectional,* and *ball wheels.* While our approach parallels the kinematic modeling of stationary manipulators, we extend the methodology to accommodate such special characteristics of wheeled mobile robots as *multiple closed-link chains, higher-pair contact points* between a wheel and a surface, and *unactuated* and *unsensed wheel degrees-of-freedom.* We survey existing wheeled mobile robots to motivate our development. To communicate the kinematic features of wheeled mobile robots, we introduce a diagrammatic convention and nomenclature. We apply the *Sheth-Uicker* convention to assign coordinate axes and develop a *matrix coordinate transformation algebra* to derive the equations-of-motion. A *wheel Jacobian matrix* is formulated to relate the motions of each wheel to the motions of the robot. We combine the individual wheel equations to form the *composite robot equation-of-motion.* We calculate the *sensed forward* and *actuated inverse* solutions and interpret the conditions which guarantee their existence. We interpret the properties of the composite robot equation to characterize the mobility of a wheeled mobile robot according to the *mobility characterization tree.* Similarly, we apply *actuation* and *sensing characterization trees* to delineate the robot motions producible by the wheel actuators and discernable by the wheel sensors, respectively. We apply our kinematic model to *design, kinematics-based control, dead-reckoning* and *wheel slip detection.* To illustrate the development, we formulate and interpret the kinematic equations-of-motion of six prototype wheeled mobile robots. *(126 pages)*

Analysis of Human Communication During Assembly Tasks

K. Suzanne Barber and Gerald J. Agin

CMU-RI-TR-86-13, June 1986

This paper studies human-to-human interaction in an attempt to shed some light on the kinds of human-to-machine interaction that will be necessary for intelligent robot learning of assembly tasks. Experiments were performed in which an "expert" guided an "apprentice" through a complex assembly task using spoken language but no visual communication. An analysis of the dialog reveals that certain protocols and conventions facilitate communication, and that communication breaks down when these protocols are not observed. Five types of protocols were observed: focusing, validators, referencing, descriptors, and dialog structure. The implications of these results for human-robot communication are discussed. *(42 pages)*

On Impact Dynamics of Robotics Operations

Yu Wang

CMU-RI-TR-86-14, September 1986

For a manipulator operation, the motion of an object to be manipulated is determined by the forces applied to the object. It is important to understand the dynamics for planning successful robot operations. The presence of friction, elasticity, as well as the inertial property of the object makes the problem difficult. This paper presents an analysis of impact dynamics incorporating these phenomena. When inertial forces dominate an impact process, we find that contact modes of impact can be predicted in an impact space that represents all possible processes. The fundamental motion of the object is described by the way it will rotate. The effects of the above mentioned phenomena on the fundamental motion can be determined in the impact space. We also find that the prediction of the fundamental motion made by the quasi-static analysis is a lower bound for dynamic cases. The results of this analysis can be applied to the planning of robot manipulations. For simplicity, the operations and the object are constrained to a two dimensional space. *(38 pages)*

Treatment as Heuristic Construction: A Case Study in Cutting Fluid Selection

James E. Mogush, Dominique Carrega, Peter Spirtes, and Mark S. Fox

CMU-RI-TR-86-15, June 1986

This is the final report of the General Reasoning En-

gine and Selection Environment (GREASE) project. The GREASE project is an investigation of the application of artificial intelligence to cutting fluid selection and blending for metal machining operations. The problem is to first diagnose the machining operations to determine what fluid characteristics are required, then to select a cutting fluid which satisfies the required characteristics. The problem is exacerbated by the need to select a single fluid to be used by multiple types of operations on a variety of materials. Diagnosis is relatively simple, but treatment specification is difficult due to the variety of operations to be handled.

GREASE uses heuristic search in which the evaluation function is *heuristically constructed*. The construction of the evaluation function begins with the determination of the characteristics of an optimal fluid based on deep knowledge of the machining operations and materials. This is then altered heuristically, according to problems diagnosed with the current fluid. Once the evaluation function is complete, it is used to select an existing fluid from the product line.

GREASE has been tested extensively with results which equal that of the experts. It is now being field tested by the Chevron Corporation. *(114 pages)*

Real-Time Control and Identification of Direct-Drive Manipulators

Pradeep Kumar Khosla

Dissertation, August 1986

This dissertation addresses the area of model-based control of direct-drive manipulators. The manipulator control problem revolves around the computation of the actuating torques that will cause the manipulator to follow the desired trajectory. The model-based schemes accomplish this objective by incorporating a complete dynamics model in the computation of the actuating torques. The main hindrances in the real-time implementation and evaluation of the model-based control schemes have been the computational requirements of the inverse dynamics and the assumption that the model is accurately known. In this dissertation we present our research that removes these hindrances and paves the way for evaluating the real-time performance of the model-based control schemes.

To reduce the computational requirements, we have developed the customization procedure. We propose a convention to develop the customized equations of an N degrees-of-freedom manipulator. Our convention introduces auxilliary variables in a manner such that no two mathematically equivalent expressions have the same variable name and are thus computed only once, resulting in appreciable computational savings. The implementation of this algorithm on a Marinco processor requires a computation cycle of 1.2 ms.

To obtain an accurate dynamics model, we have developed symbolic and numerical identification algorithms. To synthesize these identification algorithms, we outline the fundamental properties of the Newton-Euler and the Lagrange-Euler dynamics formulations. The nonlinear (in dynamics parameters) Newton-Euler model is transformed into an equivalent linear (in dynamics parameters) Newton-Euler model through a nonlinear tranformation. The notion of a torque/force error model is then introduced and cast into series and parallel identifier structures for on-line and off-line dynamics parameter estimation. Our approach is illustrated by identifying the dynamics parameters of the cylindrical robot and the first three degrees-of-freedom of the CMU Direct-Drive Arm II.

To ease the difficulties associated with deriving symbolically the identification equations, we also propose a numerical version of the identification algorithm. We have experimentally implemented this algorithm to estimate the dynamics parameters of the six degrees-of-freedom CMU DD Arm II. Our identification algorithm is directly amenable to the real-time identification of the inertial parameters of the pay-load for accurate trajectory control.

Further, to increase the robustness of the identification algorithms we have also developed a procedure to categorize the dynamics parameters of a manipulator. The categorization procedure is based on the reformulation of the Newton-Euler algorithm and the customization procedure. The categorization algorithm allows us to classify the dynamics parameters, based on the kinematics of the manipulator, into three categories: uniquely identifiable, identifiable in linear combinations, and unidentifiable. For a given trajectory, the categorization procedure also allows us to determine if the trajectory is persistently exciting.

Finally, we have implemented the model-based control schemes at a sampling rate of 2 ms. and evaluated their performance. Specifically, we compare the computed-torque, feedforward compensation and the independent joint control schemes. Our experiments have conclusively established the need for including the velocity dependent nonlinear Coriolis and the centrifugal terms in the dynamics model even at low speeds of operation of the manipulator. By comparing the computed-torque and the feedforward schemes, we have also demonstrated the importance of the coupling inertial terms in the dynamics model.

The following reports appeared in:

HUMAN COMPUTER INTERACTION
A Journal of Theoretical, Empirical, and Methodological issues of User Science and of System Design

Novice LISP Errors: Undetected Losses of Information from Working Memory

John R. Anderson and Robin Jeffries

Volume 1, Number 2, 1985

Four experiments study the errors students make using LISP functions. The first two experiments show that frequency of errors is increased by increasing the complexity of irrelevant aspects of the problem. The experiments also show that the distribution of errors is largely random and that subjects' errors seem to result from slips rather than from misconceptions. Experiment 3 shows that subjects' errors tend to involve loss of parentheses in answers when the resulting errors are well-formed LISP expressions. Experiment 4 asks subjects, who knew no LISP, to judge the reasonableness of the answers to various LISP function calls. Subjects could detect many errors on the basis of general criteria of what a reasonable answer should look like. On the basis of these four experiments, we conclude that errors occur when there is a loss of information in the working memory representation of the problem and when the resulting answer still looks reasonable.

The Prospects for Psychological Science in Human-Computer Interaction
Allen Newell and Stuart K. Card
Volume 1, Number 3, 1985

The prospects for psychology to play a significant role in the progress of human-computer interaction are discussed. In any field, hard science (science that is mathematical or otherwise technical) has a tendency of driving out softer sciences, even if the softer sciences have important contributions to make. It is possible that, as computer science and artificial intelligence contributions to human-computer interaction mature, this could happen to psychology. Psychological science might prevent this by hardening the applicable psychological science, but this approach has been criticized on the grounds that the resulting body of knowledge would be too low-level, too limited, too late to affect computer technology, and too difficult to apply. The prospects are discussed for overcoming each of these obstacles.

Knowledge-Based Interface Design
William Mark
Volume 1, Number 4, 1985

A key problem in user interface design is delivering the design model on which a program is based in terms of the running software that users actually have to deal with. This paper presents a methodology for helping programmers to explicitly state a design model and link it to the actual functions and data of the programs. Terms in the model are defined according to their relationship to a set of pre-built abstract categories. The model so defined forms an explicit conceptual framework that enforces the consistency of the programmers' design, and provides the basis of user understanding of the program. Because the model is linked to actual program software, the connection of user understanding to the running code--the real user interface--is thus defined in terms of the explicit model. The methodology is presented in terms of techniques implemented in the Consul system, a knowledge-based environment for the design of integrated office automation software.

Issues in Cognitive and Social Ergonomics: From Our House to Bauhaus
John Seely Brown and Susan E. Newman
Volume 1, Number 4, 1985

Intelligibility is one of the key factors affecting the acceptance and effective use of information systems. In this article, we discuss the ways in which recognition of this factor challenges current system design strategies, as well as current theoretical perspectives and research methodologies. In particular, we claim that in order to understand the problem of system intelligibility, we must focus on not only the cognitive, but also the social aspects of system use.

After considering some of the sources of users' difficulty in understanding information systems, we propose a new global philosophy for interface design: design for the management of trouble. We discuss the design implications of four mechanisms for improving system intelligibility: (1) useful mental models of the system and its associated subsystems, (2) communicative repair in user-system interaction, (3) new training strategies, and (4) use of the larger social environment as an aid to understanding information systems.

We then discuss the possibility of developing intelligent systems capable of providing assistance and feedback related specifically to users' actions. We claim that development of such systems requires understanding the mechanisms for achieving mutual intelligibility in interaction and propose new research approaches for investigating these mechanisms.

In the final section, we elaborate on the relationship between information systems and the larger social environment, suggesting that the functionality and design of information systems can deeply influence the surrounding culture. We propose adopting a goal of socially proactive design and discuss the possibilities for embedding new paradigms for communication and problem solving in specialized information systems.

A Cognitively-Based Functional Taxonomy of Decision Support Techniques
Wayne Zachary
Volume 2, Number 1, 1986

The Decision Support Systems (DSS) field has grown rapidly drawing technology from many disciplines and pursuing applications in a variety of domains but developing little underlying theoretical structure, and poor linkage between research and practice. This paper presents a classification scheme for DSS techniques that provides a common theoretical framework for DSS research and structures and simplifies the process of designing application systems. The classification system is functional, grouping DSS techniques according to their ability to provide similar kinds of support (i.e. functions) to a human decision maker. It is also cognitively based, defining the kinds of support that decision maker's need in terms of architectural features and procedural aspects of human cognition. The classification is expressed as a taxonomy, encompassing six primary classes of decision support techniques representing the six general kinds of cognitive support that human decision makers need. The six classes are: process models which assist in projecting the future course of complex processes: choice models, which support integration of decision criteria across and/or alternatives: information control techniques which help in storage, retrieval, organization and integration of data and knowledge: analysis and reasoning techniques which support application of problem-specific expert reasoning procedures: representation aids which assist in expression and manipulation of a specific representation of a decision problem: and judgement amplification/refinement techniques, which help in quantification and de-biasing of heuristic judgements. Additional distinctions are provided to distinguish the individual techniques in each of these primary categories. The taxonomy also has practical use as a design aid for decision support systems. The kinds of decision support needs represented by the taxonomy are general and can be used to guide the analysis and decomposition of a given decision aid design. Specific needs for assistance can then be tied to specific computational techniques in the taxonomy. Methodological suggestions for using the taxonomy as a design aid are given.

Task-Action Grammars: A Model of the Mental Representation of Task Languages
Stephen J. Payne and T.R.G. Green
Volume 2, Number 2, 1986

We present a formal model of the mental representation of task languages. The model is a meta-language for defining task-action grammars: generative grammars which rewrite simple tasks into action specification. Im-

portant features of the model are: (1) Identification of the "simple tasks" that users can perform routinely and which require no control structure; (2) Representation of simple tasks by collections of semantic components reflecting a categorisation of the task world; (3) Marking of tokens in rewrite rules with the semantic features of the task world to supply selection restrictions on the rewriting of simple tasks into action specifications. This device allows the representation of family resemblances between individual task-action mappings. Simple complexity metrics over task-action grammars make predictions about the relative learnability of different task language designs. Some empirical support for these predictions is derived from the existing empirical literature on command language learning and from two unreported experiments. Task-action grammars also provide designers with an analytic tool for exposing the configural properties of task languages.

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AN INTRODUCTION TO FP
P. Harrison, H. Khoshnevisan
Research Report #85/15, August 1985, 28pp, (2.00)

In contrast with typical contemporary functional languages, FP is concerned with the manipulation of programs as opposed to objects. "Programs" are functions that map some domain of "objects" into itself. They may be either primitive or built from primitives by the application of "program-forming operations," i.e. functionals, to one or more programs. A basic FP system is specified and several programming examples illustrate the style of programming that FP encourages. The FP algebra of programs is introduced and its importance in program transformation is outlined. The FP style of functional programming is then compared with the lambda style, typical of languages such as HOPE or KRC which are based upon the lambda calculus. Finally the current state of development of FP systems is discussed and enhanced features and optimizations are considered for incorporation into the FP language and its implementation.

A SEQUENTIAL IMPLEMENTATION OF PARLOG
I. Foster, S. Gregory, G. Ringwood
Research Report #86/2, March 1986, 9pp (no charge)

The Sequential PARLOG Machine (SPM) is an abstract instruction set designed specifically for the efficient implementation of the parallel logic programming language PARLOG on sequential computers. This paper introduces a simple computational model for supporting PARLOG. The SPM embodies several refinements of this model that improve its performance in a sequential context; these are described, along with other key issues of the SPM system.

USING NARROWING TO DO ISOLATION IN SYMBOLIC EQUATION SOLVING
A.J.J. Dick, R.J. Cunningham
Research Report #86/3, March 1986, 10pp, (no charge)

The PRESS symbolic equation solving system, and other algebraic manipulation packages, use a method known as isolation for equations containing only a single occurance of an unknown. In effect, equations of the form $f(x) = y$ are rewritten by $x = f^{-1}(y)$ where f^{-1} is the inverse of f.

This paper demonstrates how the technique of narrowing implicity performs isolation to solve equations. Narrowing involves the unification of the left hand side of a rule with the equation to be solved, followed by rewritting by that rule (and others if applicable). Rewrite rules for isolation are provided, along with other properties of the functions involved, in the form $f^{-1}(f(x)) = >x$.

The potential advantage of this is that isolation ceases to be a heuristic selected for application by meta-level inference. Instead, rewrite rules for isolation are mixed with rules expressing other methods such as attraction and collection to form a single term-rewriting system, in which the conditions for applicability of all rules are the same; namely matching and unification.

The limitations of narrowing are the need to provide a finite confluent term rewriting system, which may not always be possible, and the need to avoid infinite derivations.

MODEL PROVABILITY FOUNDATIONS FOR NEGATION BY FAILURE I
D. M. Gabbay
Research Report #86/4, April 1986, 41pp, (3.00)

In this paper we make three points about negation by failure.

(A): We claim that negation by failure is a model provability notion. In fact, we use the model logic of Solovay, originally introduced to study the properties of the Goedel provability predicate of Peano Arithmetic, and show that NOT A can be read as -BOX(Program -> A), where NOT is negation by failure, - is classical negation and BOX is the modality of Solovay. We provide a model provability completion for a PROLOG program with negation by failure and show that our new completion has non of the difficulties which plague the usual Clark completion.

(B): The second point we want to make about negfation by failure is that this notion is a basic logical notion, a notion of value to pure logic (as studied since the Ancient Greeks) of equal importance and theoretical standing as notions like Possibility, Deduction, Axiom and the like. The role of negation by failure in Logic Programming is only a special case; one manifestation of its general role in logic.

(C): The third point we want to make is to point out in view of our new outlook on negation by failure, that perhaps its current use and implementation in PROLOG is not doing it justice and should be changed and improved. We shall give a few suggestions.

The rest of this section will comment on each claim briefly and the next sections will develop the detailed material backing our claims. The final section will be further discussion of what we want to do.

LOGIC PROGRAMMING ENVIRONMENT
F. McCabe
Research Report #86/5, May 1986, 30pp, (2.00)

The aim of this project is to produce an integrated Logic Programming Environment (LPE) which will support clean and efficient working on a network of single-user graphics work-stations running UNIX. Initially, the environment will be targeted at the logic language PROLOG,

but the research principles underlying the environment will be applicable to 5th generation languages such as PARLOG. The environment will include a PROLOG specific toolkit and appropriately tailored Man-Machine Interface (MMI) facilities. The scope of this project is limited scale projects such as Intellicorp's KEE product. The salient themes of the project are as follows:

(1) careful software engineering of the system architecture will enable the integration of PROLOG tools from outside this project such as those to be provided by the advanced graphical tracing and debugging tools project, and the interfacing of non-PROLOG packages; the architecture will support interactive working, providing a means for the AI/IKBS programmer to perform experimental and exploratory programming while enabling the employment of software tools, such as Systems Designers Analyst, at a later stage of development.

(2) the environment will take advantage of modern display technology to provide a high bandwidth MMI based on an investigation of the needs of PROLOG programmers; the implementation will make use of IKBS techniques to manage the MMI.

(3) it will provide an integrated toolkit whose flexibility and functionality is comparable to the procedural tools available on Lisp machines, but also includes tools which enable the programmer to exploit the declarative style of programming offered by Logic Programming.

STRUCTURED COMMON SENSE: THE ELICITATION AND FORMALIZATION OF SYSTEM REQUIREMENTS

A. Finkelstein, C. Potts

Research Report #86/7, 16pp, (no charge)

Formal methods that are tractable in small academic demonstrations do not scale up well to practical industrial situations. A principle reason is that very little attention has been paid to the method of guiding and organizing the activity by which a formal requirement specification is obtained from an informal application concept. In this paper we describe a prescriptive method. First we briefly describe the target formal system, a modal action logic. Then we describe the steps through which the practitioner progresses to derive a specification in this formal system and some of the heuristics associated with each of the steps that help in the production of an intelligible and consistant specification.

LLARMA IS MORE LOGICAL THAN YACC: A PROLOG PARSER-GENERATOR FOR NATURAL LANGUAGE ANALYSIS

J.V. Pitt, R. J. Cunningham

Research Report #86/8, July 1986, 19pp, (1.00)

Considerable effort has been applied to the research and development of computer programming languages, and impressive results have been achieved. These are formal languages of human design and very different from the Natural Languages of human use. Despite this difference, the techniques developed for analysing computer languages are of interest for experimental work on Natural Languages.

We discuss the advantages and applications of a PROLOG parser produced by a standard parser-generation technique, with respect to Natural Language. An LR-parser is produced from the written description of a possibly ambiguous context-free grammar. The grammar specification allows a hierarchical processing structure to be identified and can accomodate concurrent processing. The specification can also be used to predetermine the behaviour of the parser so that the preferred reading of an ambigious sentence can be computed first.

What we have termed "semantic relations" can be defined for each rule of the grammar and included as part of the specification. These relations can be used to resolve contact-sensetive conditions as well as determining the interpretation of a sentence. We illustrate how a PROLOG parser for an Attribute Grammar with its associated semantic relations can derive an interpretation of a string from the "meaning" of its constituent sub-strings.

LOGIC AND OBJECTS

F. McCabe

Research Report #86/9, 40pp, (3.00)

Object oriented programming is a programming methodology which is especially suited to some programming tasks: for example descrete event simulation, implementing multiple windows programming environments and computations involving multiple worlds.

In this paper we attempt to relate some of the key concepts from object oriented programming to Logic Programming. In particular we examine the class template structure of object oriented programming languages and relate it to Logic Programming. We shall see that there is indeed a natural relationship, which can contribute both to the practice of Logic Programming and to object oriented programming. The inheritance analogy suggests a solution to the problem of how to build large programs.

THE BRITISH NATIONALITY ACT AS A LOGIC PROGRAM

M.J. Sergot, F. Sadri, R. A. Kowalski, F. Kriwaczek, P. Hammond, H. T. Cory

Research Report 86/10, 46pp, (3.00)

The text of a large part of the British Nationality Act 1981 has been translated into Horn clause logic extended by negation as failure, and this has been embedded within the augmented PROLOG system APES, so that consequences of the Act can be determined mechanically. Although much of the act was straightforward to translate, many logical complications did have to be dealt with, making translation of the Act rather more difficult than might have been expected.

Logic based systems in applications such as the representation of legislation have many of the advantages cited for expert systems. Compared with conventional software, they are easier for both naive users and experts to understand, are easier to modify, and are able to explain the derivation of their conclusions. However, because legislation is already written down, such applications are potentially easier to develop than expert systems, because they do not suffer from the knowledge elicitation bottleneck.

AN APPLICATION OF GENERAL PURPOSE THEOREM-PROVING TO DATABASE INTEGRITY

F. Sadri, R. Kowalski

Research Report #86/11, 42pp, (3.00)

We propose an extension of SLDNF resolution for checking integrity constraints in deductive databases. To achieve the effect of the simplification methods investigated by Nicholas, Lloyd Topper et al., and Decker, we choose one of the clauses from the update as top clause for the attempted refutation. This builds in the assump-

tion that the database prior to the update satisfied its integrity constraints and therefore any new violation of the constraints must involve the update. Different simplification methods can be simulated by employing different strategies for literal selection.

The SLDNF resolution proof procedure needs to be extended in order

* to allow us to select as top clause any arbitary deductive rule, denial or negated literal. The last option is needed for reasoning forward from updates that are deletions from the database.
* to deal with a number of metalevel rules that are needed for reasoning about implicit deletions resulting from other deletions and additions, and
* to incorporate a more general resolution step.

The choice of SLDNF facilitates the comparison of our "consistency method" for integrity checking with other simplification methods. However, SLDNF resolution contains a number of well-known inefficiencies. These can be avoided by incorporating the required features such as negation as failure and the ability to reason about implicit deletions in other, more efficient proof procedures.

DATABASE UPDATES IN THE EVENT CALCULUS

R. Kowalski

Research Report #86/12, July 1986, 28pp, (1.50)

The event calculus was developed as a theory for reasoning about events in a logic programming framework. It is based in part on the situation calculus but focuses on the concept of event as highlighted in semantic network representations of case semantics. Its main intended application is the representation of events in database updates and discourse representation. It is closely related to Allen's interval temporal logic, Lee-Coelho-Cotta's treatment of time in deductive databases, and Chariniak and McDermott's logic-based representation of case semantics. The relationship between the event calculus, and the systems of Allen and Lee-Coelho-Cotta has been investigated by Sadri.

The first half of this paper sketches the way relational databases, model temporal logic, situation calculus and case semantics deal with the database update problem. The second half outlines the event calculus approach. We shall argue that the event calculus combines the expressive power of both case semantics and situations. Calculus overcomes the frame problem which arises in the situation calculus, and approaches in efficiency the use of destructive assignment in relational database updates.

This paper assumes some acquaintance with logic programming and negation as failure. However, it assumes no specific knowledge of the other approaches.

LOGIC-BASED TOOLS FOR BUILDING EXPERT AND KNOWLEDGE BASED SYSTEMS: SUCCESSES AND FAILURES OF TRANSFERRING TECHNOLOGY

P. Hammond

Research Report #86/13, June 1986, 15pp, (1.00)

General purpose programming tools for building expert and knowledge based systems are now available for a variety of knowledge representation formalisms. The APES system is a collection of PROLOG modules which augment the underlying PROLOG with interactive, explanatory and other useful facilities. The logical roots or PROLOG are emphasized in the way APES is to be employed by end-user, domaain expert, knowledge engineer and tool builder, each of whom has something to gain from this logic programming approach.

Recently, a survey of a APES users has begun and the paper describes some of the application domains for which APES has been used and discusses the success/failure of the transfer of the associated technology. As more detailed information becomes available, similar reports are to be produced.

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HEURISTICS FOR ANALOGY MATCHING

S. Owen

Research Paper No. 280, ECAI-86, 0.90 + postage
UK=15p, Surface=30p, Air=1.00

We analyse the heuristics that underlie analogy matching algorithms, in particular the matchers of Munyer and Kling. These matchers are reconstructed, tested, modified and assessed, and the underlying heuristics are abstracted. We propose a more principled approach to analogy matching, involving flexible application of the heuristic criteria.

AN EDINBURGH PROLOG BLACKBOARD SHELL

J. Jones & M. Millington

Research Paper No. 281, (Eds. R. Englemore & T. Morgan) Addison-Wesley, 1986, In Blackboard systems - theory and practice.
1.20 + postage. UK=20p, Surface=50p, Air=1.00

We describe an expert system shell, written in Prolog, which may be used to construct expert systems with a blackboard architecture, after the style of the HEARSAY-II speech recognition system. The system runs on a Vax 11/750 at the Department of Artificial Intelligence, University of Edinburgh, under Unix (Berkeley 4.2).

ANALYTIC GOAL REGRESSION: PROBLEMS, SOLUTIONS AND ENHANCEMENTS

R. Boswell

Research Paper No. 282, ECAI-86 and EWSL-86

Analytic goal regression is theoretically a powerful technique for concept learning, but in practice there are very few instances of its successful application in interesting domains. In the following paper I show how the technique can be improved and some of the problems overcome.

In the first section I give a very brief account of learning and problem-solving, in order to provide a framework for discussing goal regression. In the second, I summarize some points from (Porter & Kibler 85). In this paper, the authors demonstrate the limitations of goal regression, claim that "experimental goal regression" (defined in their paper) is in many ways superior, and suggest that the two may be combined. I reexamine the evidence and come to slightly different conclusions: in particular, that further work on goal regression is worthwhile, and that the problems are not insuperable.

In the third section, I suggest some solutions to the problems of goal regression, together with some further generalizations and enhancements.

A PROPOSED PROLOG STORY

A. Bundy, H. Pain, P. Brna & L. Lynch

Research Paper No. 283, Journal of Logic Programming, 1986. 0.90 + postage. Uk=15p, Surface=30p, Air=1.00

A Prolog Story is an explanation of the workings of the Prolog interpreter or compiler which a student programmer can use to understand and predict the execution of a Prolog program. In previous papers we examined the early Prolog teaching materials, and extracted the Prolog stories they used. We concluded that there was: no complete story in use, no universal agreement on what stories to use, no consistent use of a single story and no straightforward agreement between the stories in the teaching materials and the tracers, error messages, etc. provided in Prolog systems. We argued that this situation would be confusing for the novice programmer, especially those without previous computing experience and a weak scientific/mathematical background.

In this paper we list the topics that a complete Prolog story should cover. We describe techniques for covering these topics, drawing on the stories analyzed in past work. In particular, we address the question of how completeness can be attained without overwhelming the student with its complexity.

THE ALVEY LARGE SCALE DEMONSTRATOR PROJECT - DESIGN TO PRODUCT

T. Smithers

Research Paper No. 284, 0.70 + postage, UK=15p, Surface=30p, Air=1.00

Paper presented at the Third International Conference on Advanced Information Technology: Artificial Intelligence in Manufacturing - Key to Integration. Held at Gottlieb Duttweiler Institute, Zurich, November 7-8, 1985.

The projects goals and the collaborating organizations taking part in it are introduced. By contrasting the conventional design and manufacturing methodology with the aims of the Design to Product project, the central concept behind the project is presented, as that of developing an integrated engineering design support system within an automated manufacturing facility. The Artificial Intelligence techniques which will be used to support the engineering design activity and its integration within an automated manufacturing and factory control system are described.

IDENTIFY INDEPENDENT OBJECT SEGMENTATION IN 2 1/2 D SKETCH DATA

R.B. Fisher

Research Paper No. 285, 0.40 + postage. UK=15p, Surface=30p, Air=1.00

Paper being presented at 1986 European Conference on Artificial Intelligence, Brighton, July, 1986.

ENGINEERING DESIGN SUPPORT SYSTEMS

G. Sahar

Research Paper No. 286, 0.80 + postage. UK=15p, Surface=30p, Air=1.00

Paper presented at the 1st International Conference on applications of Artificial Intelligence to Engineering Problems, Southampton, 15-18 April, 1986.

Engineering design may be regarded as the passage from a specification of a requirement to a specification of an artifact that will satisfy that requirement. We shall refer to this artifact as the Designed Artifact, or DA. If a computational system is to be used to advantage in the process, it is necessary that both the specification of the requirement and that of the designed artifact should be in a formalism comprehensible to the system. We shall use the term "Design Support System" (DSS) for such a computational support for the human designer. In this paper we shall draw on experience gained in our work on implementing the Edinburgh Designer System which forms part of the Alvey Large Scale Demonstrator Project "Design to Product."

CRITERIA FOR CHOOSING REPRESENTATION LANGUAGES AND CONTROL REGIMES FOR EXPERT SYSTEMS

H. Reichgelt & F. van Harmelen

Research Paper No. 287, 1.35 + postage. UK=20p, Surface=30p, Air=1.00

Paper submitted for publication in The Knowledge Engineering Review, 1986.

Shells and high-level programming language environments suffer from a number of shortcomings as knowledge engineering tools. We conclude that a variety of knowledge representation formalisms and a variety of control regimes are needed. In addition guidelines should be provided about when to choose which knowledge representation formalism and which control regime. The guidelines should be based on properties of the task and the domain of the expert system. In order to arrive at these guidelines, we first critically review some of the classifications fo expert systems in the literature. We then give our own list of criteria. We test this list applying our criteria to a number of existing expert systems. As a caveat, we have not yet made a systematic attempt at correlating the criteria and different knowledge representations formalisms and control regimes, although we make some preliminary remarks throughout the paper.

RULE-BASED SURFACE CLASSIFICATION USING SPECULAR SONAR REFLECTIONS

J.C.T. Hallam, J.B.H. Kwa & J.A.M. Howe

Research Paper No. 288, 0.60 + postage. UK=15p, Surface=30p, Air=1.00

To appear in Proceedings of Expert Systems, 1986, Brighton, December, 1986.

This paper describes an approach to real-time surface classification using specular sonar reflections. Initially, when the surface is insufficiently sensed, multiple uncertain hypotheses pertaining to the surface type can be posted. These are revised incrementally as more evidence is received, leading eventually to a correct dominating hypothesis. The evidence combination method is based on the Dempster-Shafer theory and makes extensive use of a set of rules. These rules are established by case analysis of the combinations of observer motion and primitive surfaces. Results based on simulated noisy data indicate that this is a feasible technique for classifying primitive surfaces.

A PARSER FOR GENERALIZED PHRASE-STRUCTURE GRAMMARS

J.D. Phillips & H. S. Thompson

Research Paper No. 289, 1.10 + postage. UK=20p, Surface=50p, Air=1.00

To be published in Working Papers in Cognitive Science, 1986. (Eds.) Ewan Klein & Nick Haddock.

The Alvey Directorate, through the S.E.R.C. has spon-

sored three projects which together will produce a computer program capable of parsing sentences of a large part of the English Language. The three projects are: "A dictionary and morphological analyser for English," working on this jointly are Dr. G. D. Ritchie and Mr. A. W. Black at Edinburgh, and at Cambridge Dr. S. G. Pulman and G.J. Russell; "A computational grammar of English" under the supervision of Dr. E. J. Briscoe in Lancaster and Dr. B.K. Boguraev in Cambridge; and "A parsing tool for the natural language theme." This paper describes progress to the end of 1985 on the last named project on which the authors are working in the University of Edinburgh's Department of Artificial Intelligence.

A FORMAL MODEL OF SYSTEMIC GRAMMAR

T. Patten & G. Ritchie

Research Paper No. 290, 1.00 + postage. UK=20p, Surface=50p, Air=1.00

Paper to be presented at 3rd International Workshop on Language Generation, Nijmegen, August 19-23, 1986.

Despite the fact that systemic grammar has a relatively long history, and has been adopted in several computer implementations, it has never been rigorously formalised in the way that traditional grammars have. The reason for this appears to be that the formal tools applied to traditional structural grammars are not so easily applied to a functional theory. In addition, it seems that the "rigorous rules" used to formalise traditional grammars are viewed by systemic linguists as inherently structural. The formal model of systemic grammar presented here will involve "rigorous rules" but will not compromise the functional perspective of language as a "resource." This formalisation will allow us to define such notions as the language generated by a grammar, and to demonstrate results relating to properties of two algorithms for producing text from a grammar. The central issues discussed include the correctness and efficiencey of these generation processes.

SOME ARCHITECTURAL IMPLICATIONS OF THE USE OF SENSORS

C. A. Malcolm & A. P. Ambler

Research Paper No. 291, 1.00 + postage. UK=20p, Surface=50p, Air=1.00

Paper to be presented at Pisa NATO Conference on Robotics, September 1986. To be published by Springer-Verlag.

In the context of programming robots with sensors for assembly tasks, the architecture of an on-line system capable of supporting likely future developments in off-line programming is considered, and what the nature of the interface between the on-line and off-line components should be.

RECONSTRUCTION AND ASSESSMENT OF KLING'S ANALOGY MATCHER

Stephen Owen

WP 186, 1.10 + postage. UK=15p, Surface=50p, Air=1.00

The analogy matching algorithm due to Kling is reconstructed in Prolog, tested, analysed and assessed, particularly with respect to its use of semantic types. Several improvements are proposed. However, the basic assumptions behind the algorithm are found to be too restrictive for the construction of many interesting matches.

PETRI NETS FOR REPRESENTING ASSEMBLY PLANS

C. A. Malcolm

WP 187, 0.80 + postage. UK=15p, Surface=30p, Air=1.00

In the context of off-line robot programming of assembly tasks, this paper argues that a simple extension of Petri nets are a suitable formalism with which to encode both decisions about what to do next, based upon sensory input, and also the freedoms of temporal ordering the assembly permits. In other words, some encoding of these nets would be a suitable format for the communication of this kind of information from the off-line to the on-line system.

EXPERT SYSTEMS COURSE - M.Sc./Phd.D. 1985/86

Peter Ross

Teaching Paper No. 1, 3.50 plus postage, UK=40p, Surface=1.00, Air=2.50

What are Expert Systems? -Expert systems get badly misrepresented in the press, probably because of the emotive value of the name. They conjure up an image of a balding egg-head with half-moon glasses, offering fast excellent solutions to problems posed by mere mortals. Attempts to define them usually do little; consider one such:

"...a computer program that uses knowledge and inference mechanisms to solve problems which, when tackled by humans, require significant expertise."

The phrase "significant expertise" could cover almost anything, the quote conveys nothing about what is currently possible or not (in fact, almost everything is currently impossible).

Instead, think of them as a step or two beyond a pocket calculator. A cheap pocket calculator can do things most people cannot do, although there are a few expert human calculators who can cheerfully outperform it. Wouldn't it be useful to have a device akin to a pocket calculator which could advise you about your health, or your financial problems? Given the current state of technology, it would be quite a lot bigger than a pocket calculator, but maybe that problem will go away as hardware improves. What such a device would need would be a store of useful knowledge directly relevant to its topic, and a variety of algorithms built into it that would combine those bits of knowledge in sensible ways so as to answer your questions. So, we come to the first important questions: what is "useful knowledge," given some chosen domain, and what sort of algorithms are needed? These lecture notes cover some of the answers.

THE SLOOP MANUAL

Peter Jackson

Teaching Paper No. 2, 1.30 + postage. UK=0.20, Surface=0.50, Air=1.50

The main motivation for SLOOP was to have a small and simple message-passing language to run in Franz Lisp on VAX and SUN. Although Flavors systems for Franz do exist, they are much more extensive than SLOOP, and therefore correspondingly more difficult to tailor to one's requirements. SLOOP is meant to be a minimal syustem: a core that supports further extensions written in the SLOOP language itself.

AI-1 VISION NOTES
1985/85
J.A.M. HOWE
Teaching Paper No. 3, 6.50 + postage. UK=0.50, Surface=1.50, Air=3.50

When asked to think of a genuinely difficult task, we usually pick something like solving a physics problem, playing chess or learning a foreign language. Few would say that "seeing an object" is a difficult task just because few people realize what an astonishing achievement it is to be able to see at all. We explain "eye as camera," "visual illusions and seeing," etc. in these notes.

ANNOUNCEMENTS

Special Invitation to Universities and Research Institutes

The AAAI would like to extend a special invitation to academic institutions and non-profit research laboratories to participate in the Exhibit Program at the Sixth National Conference on Artificial Intelligence, July 14-16, 1987 in Seattle, Washington. It is important to communicate what universities and laboratories are doing and demonstrate your research efforts at the conference. Last year we initiated this new addition was considered one of the highlights of the 1986 conference.

AAAI will provide each institution with one 10'x10' booth free, room to describe your demonstration in the Exhibit Guide, and assist with your logistical arrangements. Some direct costs are involved which the AAAI cannot provide assistance with. Those costs include shipping equipment to the site, telephone lines (communication (required) or computer), housing, and others. We can direct interested groups to vendors who may be able to assist with equipment needs. Last year, many hardware vendors donated equipment for the university demonstrations and will continue with this practice next year.

We hope you can join us in Seattle and help disseminate the latest research results to our conference attendees.

If you or your department are interested in participating, please contact:

Steven Taglio
AAAI
445 Burgess Drive
Menlo Park, CA 94025
(415) 328-3123
AAAI-Office@sumex-aim.arpa

THE SIXTH ACM SYMPOSIUM ON PRINCIPLES OF DATABASE SYSTEMS

Call for Exhibits

The Sixth ACM Symposium on Principles of Database Systems will take place between March 23 and March 25, 1987, at the Bahia Resort Hotel in San Diego. The symposium will cover new developments in both theoretical and practical aspects of database and knowledge-based systems. Previous symposia have been attended by researchers from both industry and academia. For the first time, this year the symposium will include exhibits of state-of-the-art products from industry. If you have a product you would like to exhibit, please send a brief description by December 15, 1986, to:

Victor Vianu
Local Arrangements Chairman, PODS '87
EECS Department, MC-014
Univ. of California at San Diego
La Jolla, California 92093
(619) 534-6227
vianu@sdcsvax.ucsd.edu

Since space is limited, exhibits will be selected based on the proposals received. Your contribution would be greatly appreciated.

INDEX to
SIGART #98 October 1986

Forming Local

We intend to start a local SIGART in the Tidewater/Peninsula area of Virginia in 1987. An initial organizational meeting will be held in the spring. An announcement of the details is planned for a later issue of the SIGART newsletter. In the meantime, we would like to determine the level of interest in our local area. If you are interested in helping to form the local, please contact one of the people listed below:

Jim Rogers Mail Stop 246 NASA Langley Research Center Hampton, Va. 23665 (804) 865-2887

Nancy Sliwa Mail Stop 152D NASA LaRC Hampton, Va. 23665 (804) 865-3871

Kathy Abbott Mail Stop 156A NASA LaRC Hampton, Va. 23665 (804) 865-3621 abbott@red.rutgers.edu

Sixth ACM SIGACT-SIGMOD-SIGART Symposium

on

PRINCIPLES OF DATABASE SYSTEMS

March 22-25, 1987

San Diego, California

INFORMATION

LOCATION

The technical sessions, business meeting, Sunday evening reception, and lunches will all be at the Bahia Resort Hotel, situated on San Diego's Mission Bay. The Bahia is within walking distance of the beach, recreational facilities (sailing, tennis courts, pool), Sea World, and relaxed boardwalk shops and cafes. Checkout time is 1pm; checkin time is 4pm, or earlier subject to room availability. A block of rooms has been reserved until March 1, 1987. Please reserve a room by using the form provided or by calling 800-821-3619 (800-542-6010 within California). First night's deposit is required. Room rates and availability are not guaranteed past March 1.

REGISTRATION

Advanced registration is requested using the form provided. Registration rates go up markedly after March 9. A registration desk will be open Sunday night from 6:00 p.m. to 10:00 p.m., and during the day on Monday (8:30 a.m. to 6:00 p.m.). Registrants, other than students, receive admission to the technical sessions, one copy of the proceedings, reception, lunches, and a dinner cruise on Tuesday evening. Student registration, available to full-time students only, includes the technical sessions and one copy of the proceedings. Additional copies of the proceedings will be available for sale at the registration desk.

TRANSPORTATION

There are three choices for ground transportation from the airport to the hotel. Courtesy airport transportation is provided by the hotel. The Bahia Hotel van leaves the airport every two hours, starting at 7:30am and ending at 9:30pm. The van can also be called outside scheduled times using the free telephone marked "Bahia Hotel" at the hotel reservation desk in the airport arrival lounge. Additionally, a regular limousine van is available for $5 (direction Mission Bay). Taxi fare to the hotel is about $10.

For participants driving to San Diego on I-5, take I-8 West, then exit at West Mission Bay Drive. The hotel is located on the North side of Mission Bay Drive.

CLIMATE

The average temperature in March is 60 degrees. Rain is unlikely, but cannot be ruled out. Earthquakes are likely, but not promised.

EVENT LOCATION

All technical sessions and the business meeting are in the Mission Room. The exhibit program is in the Mission Loung. Sunday night registration and the reception are in the Del Mar Room. On Tuesday night there will be a dinner cruise with live music around the San Diego Harbor, between 6:30pm and 9pm. Transportation to the harbor will be provided. Buses will leave the hotel at 6pm.

SUNDAY, MARCH 22, 1987

Reception 8:30 pm - 11 pm, Del Mar Room

MONDAY, MARCH 23, 1986

SESSION 1 9:00 am - 10:35 am

Chair: M.Y. Vardi (*IBM Almaden Research Center*)

Invited Talk: Database Theory - Past and Future, J.D. Ullman (*Stanford University*)

Logic Programming with Sets, G.M. Kuper (*IBM T.J. Watson Research Center*)

Sets and Negation in a Logic Database Language (LDL1), C. Beeri (*Hebrew University*), S. Naqvi (*MCC*), R. Ramakrishnan (*University of Texas at Austin* and *MCC*), O. Shmueli, and S. Tsur (*MCC*)

Coffee Break 10:35 am - 11:00 am

SESSION 2 11:00 am - 12:15 pm

Chair: A.K. Chandra (*IBM T.J. Watson Research Center*)

Logical Design of Relational Database Schemes, L.Y. Yuan (*University of Southern Louisiana*) and Z.M. Ozsoyoglu (*Case Western Reserve University*)

On Designing Database Schemes Bounded or Constant-Time Maintainable with Respect to Functional Dependencies, E.P.F. Chan and H.J. Hernandez (*University of Alberta*)

Computing Covers for Embedded Functional Dependencies, G. Gottlob (*CNR, Italy*)

SESSION 3 2:00 pm - 3:15 pm

Chair: R. Fagin (*IBM Almaden Research Center*)

Dynamic Query Interpretation in Relational Databases, A. D'Atri (*Universita "La Sapienza" di Roma*), P. Di Felice (*Universita dell'Aquila*), and M. Moscarini (*CNR, Italy*)

A New Basis for the Weak Instance Model, P. Atzeni (*CNR, Italy*) and M.C. De Bernardis (*Universita "La Sapienza" di Roma*)

Answering Queries in Categorical Databases, F.M. Malvestuto (*Italian Energy Commision*)

Coffee Break 3:15 pm - 3:45 pm

SESSION 4 3:45 pm - 5:25 pm

Chair: U. Dayal (*CCA*)

Nested Transactions and Read-Write Locking, A. Fekete (*Harvard University*), N. Lynch (*MIT*), M. Merrit (*AT&T Bell Laboratories*), and W. Weihl (*MIT*)

Transaction Commitment at Minimal Communication Cost, A. Segall and O. Wolfson (*Technion*)

The Precedence-Assignment Model for Distributed Databases Concurrency Control Algorithms, C.P. Wang and V.O.K. Li (*University of Southern California*)

A Knowledge-Theoretic Analysis of Atomic Commitment Protocols, V. Hadzilacos (*University of Toronto*)

Business Meeting: 8:30 pm - 10:00 pm, Mission Room

TUESDAY, MARCH 24, 1986

There will be exhibits in the Mission Lounge

SESSION 5 9:00 am - 10:35 am

Chair: T. Imielinski (*Rutgers University*)

Invited Talk: Perspectives in Deductive Databases, J. Minker (*University of Maryland*)

Maintenance of Stratified Databases Viewed as a Belief Revision System, K. Apt (*Ecole Normal Superieure* and *Universite Paris 7*) and J.M. Pugin (*BULL Research Center*)

Specification and Implementation of Programs for Updating Incomplete Information Databases, S. Hegner (*University of Vermont*)

Coffee Break 10:35 am - 11:00 am

SESSION 6 11:00 am - 12:15 pm

Chair: H. Korth (*University of Texas at Austin*)

Operation Specific Locking on B-Trees, A. Billiris (*Boston University*)

Concurrency Control in Database Structures with Relaxed Balance, O. Nurmi, E. Soisalon-Soininen (*Universitat Karlsruhe*), and D. Wood (*University of Waterloo*)

Performance Results on Multiversion Timestamping Concurrency Control with Predeclared Writesets, R. Sun (*Iona College*) and G. Thomas (*Clarkson University*)

SESSION 7 2:00 pm - 3:15 pm

Chair: V. Vianu (*University of California at San Diego*)

Decomposing an N-ary Relation into a Tree of Binary Relations, R. Dechter (*Hughes Aircarft Company* and *University of California at Los Angeles*)

Formal Bounds on Automatic Generation and Maintenance of Integrity Constraints, J.P. Delgrande (*Simon Fraser University*)

Relative Knowledge in a Distributed Database, T. Imielinski (*Rutgers University*)

Coffee Break 3:15 pm - 3:45 pm

SESSION 8 3:45 pm - 5:25 pm

Chair: M. Yannakakis (*AT&T Bell Laboratories*)

The Parallel Complexity of Simple Chain Queries, F. Afrati (*National Technical University of Athens*) and C. Papadimitriou (*Stanford University* and *National Technical University of Athens*)

Bounds on the Propagation of Selection into Logic Programs, C. Beeri (*Hebrew University*), P. Kanellakis (*Brown University*), F. Bancilhon (*INRIA* and *MCC*), R. Ramakrishnan (*University of Texas at Austin* and *MCC*)

A Decidable Class of Bounded Recursions, J.F. Naughton (*Stanford University*) and Y. Sagiv (*Hebrew University*)

Decidability and Expressiveness Aspects of Logic Queries, O. Shmueli (*Technion* and *MCC*)

Dinner Cruise: 6:30 pm - 9:00 pm

WEDNESDAY, MARCH 25, 1986

SESSION 9 9:00 am - 10:35 am

Chair: P.A. Larson (*University of Waterloo*)

Invited talk: Chickens and Eggs - The Interrelationship of Systems and Theory, P. Selinger (*IBM Almaden Research Center*)

Axiomatization and Simplification Rules for Relational Transactions, A. Karabeg, D. Karabeg, K. Papakonstantinu, and V. Vianu (*University of California at San Diego*)

A Transaction Language Complete for Database Update and Specification, S. Abiteboul (*INRIA*) and V. Vianu (*University of California at San Diego*)

Coffee Break 10:35 am - 11:00 am

SESSION 10 11:00 am - 12:15pm

Chair: Y. Sagiv (*Hebrew University*)

On the Power of Magic, C. Beeri (*Hebrew University*) and R. Ramakrishnan (*University of Texas at Austin* and *MCC*)

Efficient Evaluation for a Subset of Recursive Queries, G. Grahne (*University of Helsinki*), S. Sippu (*University of Jyvaskyla*), and E. Soisalon-Soininen (*University of Helsinki*)

Worst-Case Complexity Analysis of Methods for Logic Query Implementation, A. Marchetti-Spaccamella, A. Pelaggi (*Universita "La Sapienza" di Roma*), and D. Sacca (*CRAI*, Italy)

SESSION 11 2:00 pm - 4:35pm

Chair: P. Kanellakis (*Brown University*)

On the Expressive Power of the Extended Relational Algebra for the Unnormalized Relational Model, D. Van Gucht (*Indiana University*)

Safety and Correct Translation of Relational Calculus Formulas, A. Van Gelder (*Stanford University*) and R. Topor (*University of Melbourne*)

Safety of Recursive Horn Clauses with Infinite Relations, R. Ramakrishnan (*University of Texas at Austin* and *MCC*), F. Bancilhon (*INRIA* and *MCC*), and A. Silberschatz (*University of Texas at Austin*)

Coffee Break 3:15 pm - 3:45 am

One-Sided Recursions, J.F. Naughton (*Stanford University*)

Optimizing Datalog Programs, Y. Sagiv (*Hebrew University*)

CONFERENCE ORGANIZATION

Sponsors: SIGACT, SIGMOD, and SIGART.

Executive Committee: A.K. Chandra, S. Ginsburg, A. Silberschatz, J.D. Ullman, and M.Y. Vardi.

Chairman: Ashok K. Chandra, IBM T.J. Watson Research Center, P.O.Box 218, Yorktown Heights, NY 10598, (914) 945-1752, ashok@ibm.com, ashok@yktvmv.bitnet

Program Chairman: Moshe Y. Vardi, IBM Almaden Research Center, 650 Harry Rd., San Jose, CA 95120-6099, (408) 927-1784, vardi@ibm.com, vardi@almvma.bitnet

Local Arrangements: Victor Vianu, Dept. of Electrical Engineering and Computer Science MC-014, University of California at San Diego, La Jolla, CA 92093, (619) 534-6227, vianu@sdcsvax.ucsd.edu

Program Committee:

Umesh Dayal	Kari-Jouko Raiha
Tomasz Imielinski	Yehoshua Sagiv
Paris Kanellakis	Moshe Vardi
Hank Korth	Mihalis Yannakakis
Per-Ake Larson	

ADVANCE REGISTRATION FORM, ACM-PODS

Please send this form or a facsimile along with a money order or check (payable to 6th ACM SYMPOSIUM ON PRINCIPLES OF DATABASE SYSTEMS) to:

ACM-PODS Registration
c/o Victor Vianu
EECS Department, MC-014
Univ. of California at San Diego
La Jolla, California 92093

	(Before Mar. 9)		(After)	
ACM *and* SIG member	$165	☐	$225	☐
ACM member only	$175	☐	$235	☐
SIG member only	$175	☐	$235	☐
Nonmember:	$205	☐	$275	☐
Student:	$50	☐	$60	☐

Requests for refunds will be honored until March 9, 1987.

Name_____
Affiliation_____
Address_____
City_____ State_____ Zip_____
Country_____ Telephone_____
Net Address_____

☐ Check here if confirmation of registration is required.

Dietary restrictions: ☐ Kosher ☐ Vegetarian

Special meals can be guaranteed only for those who register in advance.

HOTEL RESERVATION FORM, ACM-PODS

Please mail this form or a facsimile (being sure to mention the ACM-PODS Conference) by March 1, 1987 to:

Bahia Resort Hotel
998 W. Mission Bay Dr.
San Diego, CA 92109
Tel: (619) 488-0551

Accommodations desired:

☐ Single $68 ☐ Double (1 bed) $72
☐ Twin (2 beds) $72 ☐ Triple $76
☐ Quad $80

Children under 12 stay free when occupying same rooms as parents. Accomodation prices do not include 7% city hotel tax.

Arrival date_____ Time_____
Departure date_____ Time_____
Name_____
Sharing room with_____
Address_____
City_____ State_____ Zip_____
Country_____ Telephone_____

First night deposit is required.

☐ First night's deposit enclosed: $_____
☐ Credit card: ☐ VISA, ☐ Mastercard, ☐ Amer. Express
☐ Other credit card: _____
Credit card number_____
Exp. Date_____

Signature_____

CALL FOR PAPERS

DIRECTIONS AND IMPLICATIONS OF ADVANCED COMPUTING

Seattle, Washington July 12, 1987

The adoption of current computing technology, and of technologies that seem likely to emerge in the near future, will have a significant impact on the military, on financial affairs, on privacy and civil liberty, on the medical and educational professions, and on commerce and business.

The aim of this symposium is to consider these influences in a social and political context as well as a technical one. The social implications of current computing technology, particularly in artificial intelligence, are such that attempts to separate science and policy are unrealistic. We therefore solicit papers that directly address the wide range of ethical and moral questions that lie at the junction of science and policy.

Within this broad context, we request papers that address the following particular topics. The scope of the topics includes, but is not limited to, the sub-topics listed.

RESEARCH FUNDING
- Sources of Research Funding
- Effects of Research Funding
- Funding Alternatives

DEFENSE APPLICATIONS
- Machine Autonomy and the Conduct of War
- Practical Limits to the Automation of War
- Can An Automated Defense System Make War Obsolete?

COMPUTING IN A DEMOCRATIC SOCIETY
- Community Access
- Computerized Voting
- Civil Liberties
- Computing and the Future of Work
- Risks of the New Technology

COMPUTERS IN THE PUBLIC INTEREST
- Computing Access for Handicapped People
- Resource Modelling
- Arbitration and Conflict Resolution
- Educational, Medical and Legal Software

Submissions will be read by members of the program committee, with the assistance of outside referees. The program committee includes Andrew Black (U. of WA), Alan Borning (U. of WA), Jonathan Jacky (U. of WA), Nancy Leveson (UCI), Abbe Mowshowitz (CCNY), Herb Simon (CMU), and Terry Winograd (Stanford).

Complete papers, not exceeding 6000 words, should include an abstract, and a heading indicating to which topic it relates. Papers related to AI and/or in-progress work will be favored. Submissions will be judged on clarity, insight, significance, and originality. Papers (3 copies) are due by April 1, 1987. Notices of acceptance or rejection will be mailed by May 1, 1987. Camera ready copy is due by June 1, 1987.

Proceedings will be distributed at the Symposium, and will be on sale during the 1987 AAAI conference.

For further information, contact Jonathan Jacky 206-548-4117 or Doug Schuler 206-783-0145.

Sponsored by **Computer Professionals for Social Responsibility**
Box 85481
Seattle, WA 98105

CALL FOR PARTICIPATION

Workshop on Qualitative Physics
May 27–29, 1987
Urbana, Illinois

Sponsored by:

American Association for Artificial Intelligence,
Qualitative Reasoning Group, University of Illinois
at Urbana-Champaign

Organizing Committee:

Ken Forbus, Chairman (Illinois)
Johan de Kleer (Xerox PARC)
Jeff Shrager (Xerox PARC)
Dan Weld (MIT)

Objectives: Qualitative Physics, the subarea of artificial intelligence concerned with formalizing reasoning about the physical world, has become an important and rapidly expanding topic of research. The goal of this workshop is to provide an opportunity for researchers in the area to communicate results and exchange ideas. Relevant topics of discussion include:

- Foundational research in qualitative physics
- Implementation techniques
- Applications of qualitative physics
- Connections with other areas of AI (e.g., machine learning, robotics)

Attendance: Attendence at the workshop will be limited in order to maximize interaction. Consequently, attendence will be by invitation only. If you are interested in attending, please submit an extended abstract (no more than six pages) describing the work you wish to present. The extended abstracts will be reviewed by the organizing committee. No proceedings will be published; however, a selected subset of attendees will be invited to contribute papers to a special issue of the International Journal of Artificial Intelligence in Engineering. There will be financial assistance for graduate students who are invited to attend.

Requirements: The deadline for submitting extended abstracts is February 10th. On-line submissions are not allowed; hard copy only please. Any submission over 6 pages, or rendered unreadable due to poor printer quality or microscopic font size will not be reviewed. Since no proceedings will be produced, abstracts describing papers submitted to AAAI-87 are acceptable. Invitations will be sent out on March 1st. Please send 6 copies of your extended abstracts to:

Kenneth D. Forbus
Qualitative Reasoning Group
Department of Computer Science
University of Illinois
1304 W. Springfield Avenue
Urbana, Illinois, 61801