

# Third Annual Expert Systems in Government Conference

Proceedings

October 19-23, 1987  
Capitol Hilton  
Washington, D.C.

Editors:

H. James Antonisse  
John W. Benoit  
Barry G. Silverman

BIBLIOTHEQUE DU CERIST



Computer Society Order Number 609  
Library of Congress Number 87-60296  
IEEE Catalog Number 87CH2487-0  
ISBN 0-8186-0205-8  
DAN 264-620X



THE COMPUTER SOCIETY  
OF THE IEEE



THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS, INC.



The MITRE Corporation

George Washington University

In association with  
AIAA National Capital Section

# Table of Contents

<b>Message for the ESIG '87 Conference Chair .....</b>	iii
<b>Program Chairs' Message .....</b>	v
<b>Conference Committee .....</b>	vii
<b>Session Chairs .....</b>	ix
<b>Reviewers .....</b>	xi
<b>Knowledge Representation and Inference</b>	
A Context-Dependent Terrain Classification Paradigm for Land Mobility Problems.....	2
<i>R.S. Ross, R.B. McGhee, M.J. Zyda, and N.C. Rowe</i>	
Nonmonotonic Reasoning by Minimizing Contradiction in a Hedged Predicate Calculus .....	6
<i>S. Post</i>	
<b>Intelligent Interfaces</b>	
Building a Knowledge Base for Information Retrieval .....	12
<i>H. Mili and R. Rada</i>	
An Intelligent Navigational Assistant for a Decision Resource Database.....	19
<i>B.I. Blum, S.D. Diamond, M.G. Hammond, M.E. Perkins, and R.D. Semmel</i>	
Extending Expert System Techniques with Information Retrieval Methods	
To Select Foster Homes .....	26
<i>E.A. Fox and S.G. Winett</i>	
<b>Natural Language Interfaces for Expert Systems</b>	
An Efficient Context-Free Parsing Algorithm Based on Register Vector Grammars .....	34
<i>J.H. Reed</i>	
An Abductive Approach to Natural Language Interfaces for Expert Systems.....	41
<i>V.R. Dasigi and J.A. Reggia</i>	
Information Extraction from Natural Language Messages.....	47
<i>R.B. Loatman and M.G. McCown</i>	
An Intelligent Assistance System in the Unix Domain .....	55
<i>H. Neelakandan, G. Biswas, and M.M. Matthews</i>	
<b>Parallelism and Problem Decomposition</b>	
Connectionism Applied to a Real-Time Expert System for Tactical Data Fusion .....	66
<i>J.R. MacRae and C.D. Byrne</i>	
A Distributed Development Environment for Distributed Expert Systems.....	72
<i>D.J. MacIntosh and S.E. Conry</i>	
"Large Systems" in Low End Development Environments .....	80
<i>R. Vitalo, P. Vitalo, D. Meyers, and J. Marchal</i>	
A Time Window Solution to Scheduling Simulation Events on Parallel Processors .....	88
<i>L.M. Sokol and D.P. Briscoe</i>	
<b>Knowledge Acquisition and Refinement</b>	
Ark: Acquiring and Reasoning About Knowledge .....	96
<i>B.E. Tonn and L.F. Arrowood</i>	
A New Approach to Checking Knowledge Bases for Inconsistency and Redundancy.....	102
<i>A. Ginsberg</i>	
Prediction-Based Competitive Learning in the M2 System .....	112
<i>K.S. Keller and H.J. Antonisse</i>	

EXPERT MODEL for Knowledge Acquisition . . . . .	117
<i>H. Taki, K. Tsubaki, and Y. Iwashita</i>	
<b>Applications in Electronics</b>	
An Expert System for Electronics Design . . . . .	126
<i>G. Clark, M. Pecht, and T. Sawyer</i>	
Integration of an Adaptive Diagnostic Expert System into an Avionics Test Environment . . . . .	132
<i>W.E. Bond, D.C. St. Clair, B.B. Flachsbart, and A.R. Vigland</i>	
Real-Time Analysis of Telemetry Data . . . . .	137
<i>S. Kao, T. Laffey, J. Schmidt, J. Read, and L. Dunham</i>	
Optimizing Material Selections for Performance and Supportability with an Expert System . . . . .	145
<i>M. Darmody and G. Chadwick</i>	
<b>Diagnostic Problem Solving</b>	
ABLOG: Improvements on an Abductive Approach to Diagnostic Problem Solving . . . . .	150
<i>S. Goodall, J.A. Reggia, S. Tuhrim, and B.-T. Chu</i>	
Managing Resources--Scheduling, Monitoring, and Fault Diagnosis with an Expert System . . . . .	155
<i>M. Crone, E. Dash, and P. Julich</i>	
Network Fault Diagnosis: Knowledge Representation Using Parallel Reasoning . . . . .	161
<i>S. Miksell, R. Quillin, and D. Lowe</i>	
An Analysis of Qualitative Reasoning and Dependency Modeling in Fault Diagnosis and Testability Assessment . . . . .	169
<i>N.E. Fredman</i>	
<b>Modeling and Inferring Decision Processes</b>	
JESSE: An Information Processing Model of Policy Decision Making . . . . .	178
<i>A. Goel, B. Chandrasekaran, and D. Sylvan</i>	
Multiagent Plan Recognition in an Adversarial Domain . . . . .	188
<i>J. Azarewicz, G. Fala, I. Hayslip, and C. Heithecker</i>	
A Simulation Framework for Machine Learning Research . . . . .	194
<i>H.J. Antonisse</i>	
Integrating Plans and Scripts: An Expert System for Plan Recognition . . . . .	201
<i>J.W. Benoit, J.R. Davidson, E.J. Hofmann, S.J. Laskowski, and R.R. Leighton</i>	

## **Consultation Systems and Decision Aids**

An Expert System Design Incorporating Fuzzy Logic for Diagnosing Heat Imbalances in a Nuclear Power Plant . . . . .	210
<i>M.A.S. Guth</i>	
Intelligent Analysis of Seismic Events . . . . .	217
<i>K. Kandt, P. Yuenger, and D. Baumgardt</i>	
Survey of Nonmilitary Applications of Expert Systems in Governments . . . . .	224
<i>T. Gomi</i>	
An Expert System for the Administration of the Acreage Limitation Provision of the Reclamation Reform Act of 1982 . . . . .	243
<i>L. Berkowitz and K. Strzepak</i>	

## **Design and Analysis of Knowledge-Based Systems**

Prototyping, Validation and Maintenance of Knowledge-Based Systems Software . . . . .	248
<i>L.F. Pau</i>	
Impact Assessment: A Case Study for Scheduling NASA's Tracking and Data Relay Satellite System (TDRSS) Resources . . . . .	254
<i>B.K. Das and R.A. Berg</i>	

An Expert System for Selecting Appropriate Domains for Expert Systems.....	260
<i>G.A. Davis and D. Yeh</i>	
Security Considerations for Knowledge-Based Systems .....	266
<i>T.A. Benson and T.F. Lunt</i>	
<b>Panel Sessions .....</b>	<b>273</b>
Summary of Activities in Evaluating and Merging Thesauri .....	275
<i>R. Rada</i>	
Future Directions for Solving Real-Time Knowledge Acquisition Problems under Real World Conditions—Introductory Remarks .....	277
<i>R.A. Kennedy</i>	
Connectionist Expert Systems—A Proposal for a Hybrid Approach .....	278
<i>Y.C. Lee</i>	
Experiments in Knowledge Acquisition—The Need for New Models of Expertise .....	279
<i>J. Roach</i>	
An Intelligent Advisory System for Private Sewage Facility Permits: Two Years in the Trenches .....	280
<i>W.J. Hadden, Jr., and S.G. Hadden</i>	
<b>Author Index .....</b>	<b>285</b>