

## Table of Contents

### 18 Indexed vs. Unindexed Searching: From Security Classifications to Forensics

**Elizabeth Thede** discusses the differences between indexed and unindexed searching and when to use which technique.

### 24 Neural Nets and Scientific Discovery: A Match Made in AI Heaven

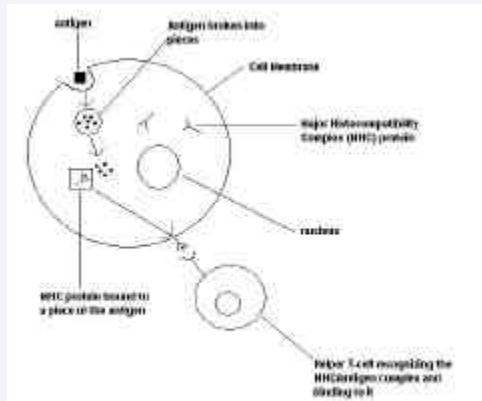
**Ilana Marks** presents some of the ways that neural network technologies are being used to expedite the scientific research process and provide valuable insights that might otherwise be overlooked.

### 29 The Visual Development of Rule-Based Systems

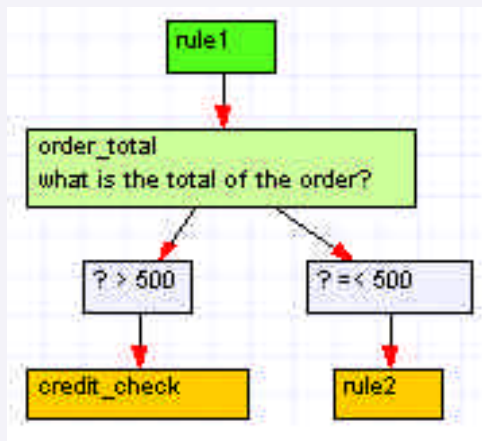
**Charles Langley and Clive Spenser** detail the creation of a rule-based system using visual representations of rules rather than traditional text-based representations.

### 37 Protégé, Ontology and Knowledge Acquisition: Knowledge Representation, the Foundation of Intelligent Systems

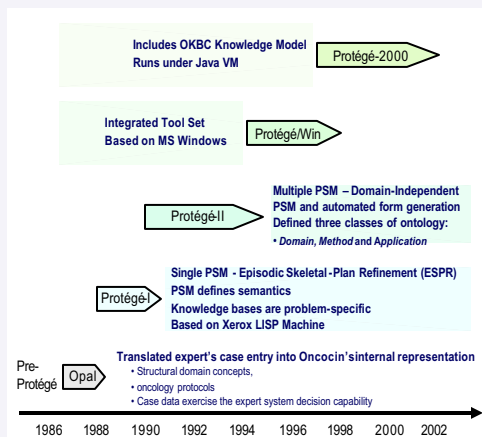
**Terry Hengl** discusses a knowledge-base application development tool called Protégé and how it uses ontologies to define terms and concepts in useful ways.



Page 24



Page 29



Page 37

## Columns

### 58 Book Zone

- \*Applying UML
- \*Text Mining: Predictive Methods for Analyzing Unstructured Information
- \*Spoken Dialogue Technology: Towards the Conversational User Interface
- \*Fuzzy Control of Queuing Systems
- \*Data Modeling Essentials, Third Edition
- \*Requirements Engineering
- \*Object-Oriented Construction Handbook: Developing Application-Oriented Software with the Tools & Materials Approach

Ilana Marks

### 62 Buyer's Guide

Fuzzy Logic, Fuzzy SQL, Intelligent Process Control, Neural Networks, Speech Recognition, Text Mining, Web Utilities

## Regular Features

### 7 Editorial

**8 Product Update** Business Applications, Data Mining and Modeling, Decision Support, Intelligent Search Tools, Intelligent Tools, Modeling, Robotics, Announcements, AI Conferences, Training

### 49 AI-Q Crossword Puzzle

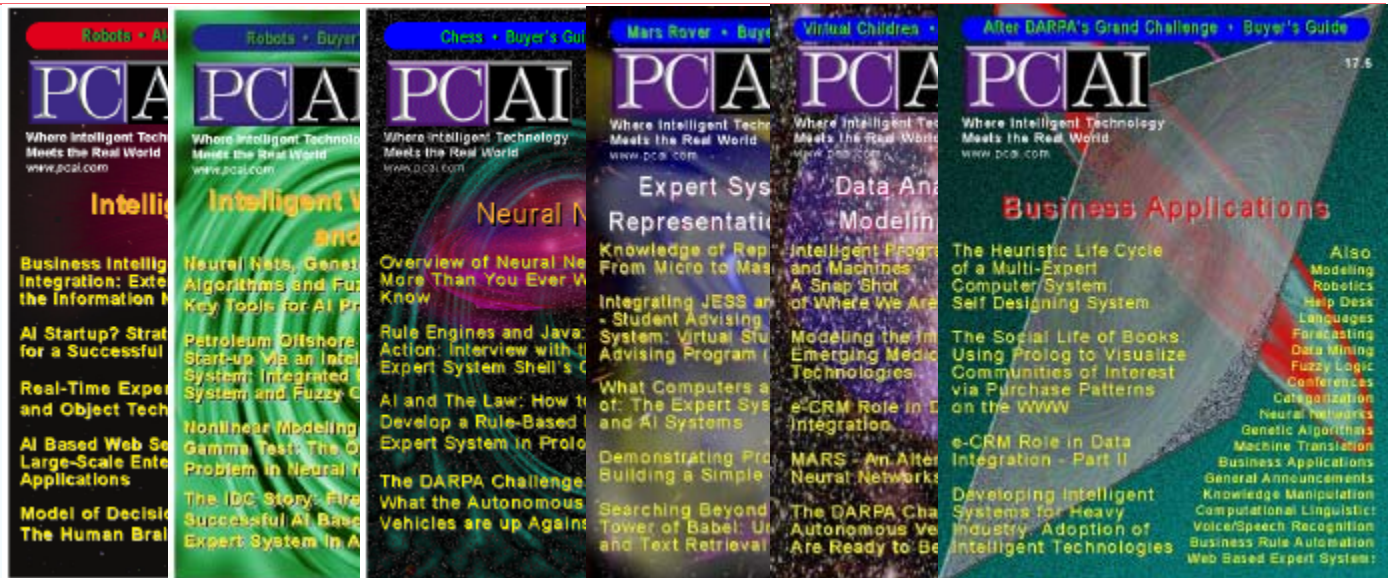
Neural Networks, Fuzzy Logic, and Speech Recognition

### 52 AI and the Net

Virtual Museum Education Assistant, Call Center Computers, Nose Mouse, Network of Robotic Telescopes, and more.

Ilana Marks

### 75 Classifieds and Recruiting



## **PC AI Volume 17 now on CD**

**6 Issues in both HTML and PDF  
Issues 17.1 - 17.6 (2003-2004)**

**Additional updates and bonus video not in  
the original issues.**

**All web issues reformatted with PC AI  
Navigation Bar**

**Higher Quality PDF's**

**Over 70 articles, columns and puzzles**

### **Sample articles include:**

*The Social Life of Books  
The DARPA Challenge  
Searching Beyond the Tower of Babel  
AI and the Law  
and much, much more.*

### **Topics included:**

*Data Mining, Robotics, Business Rules,  
Genetic Algorithms, Prolog, LISP, Business  
Forecasting, Case-Based Reasoning,  
Knowledge Management, Agents, Fuzzy  
Logic, Intelligent Tutoring, Expert Systems,  
Logic Programming, Modeling and  
Simulation, Searching, Pattern Matching,  
Natural Language Processing, etc.*

### **Buy PC AI Volume 17 on CD**

**For Paid Subscribers - \$14 each CD  
Non-Paid Subscribers - \$32 each CD**

**US Postage - \$3.00 for postage per CD**

**Foreign Postage - \$5.00 per CD)**

*(Quantity Discounts are available)*

**Order online at  
[www.pcai.com/store](http://www.pcai.com/store)**

**or  
Contact PC AI directly  
(602) 971-1869**



Also Available: Volume 16 CD  
Issues 16.1 - 16.6 (2002-2003)  
PLUS a special bonus issue -  
15.6 - AI to Combat Terrorism



Where Intelligent Technology  
Meets the Real World

**Publisher**

Terry Hengl

**Senior Editor**

Don Barker

**Webmaster**

Ilana Marks

**Columnists/Editors**

Elisa Hicks

Ilana Marks

Casper Goldberg

Paul E. Grayson

**Contributors**

Terry Hengl

Charles Langley

Ilana Marks

Clive Spenser

Elizabeth Thede

**Layout and Typography**

Michael Wiederhold

**Graphic Design and Illustration**

Laurens Watson

**Vice President of Marketing**

Robin Okun

**Editorial Assistant**

Lauren Dana

Please direct all editorial and  
advertising inquiries to:

PC AI

PO Box 30130

Phoenix, AZ 85046-0130

(602) 971-1869

[info@pcai.com](mailto:info@pcai.com)

[www.pcai.com](http://www.pcai.com)

Subscription rates are \$25 for one  
year (6 issues); \$40 for two years  
(12 issues)

Entire contents copyright ©2004 by  
Knowledge Technology, Inc., unless  
otherwise noted.

Authorization to photocopy items  
published in PC AI Magazine for  
internal or personal use, or the internal  
or personal use of specific clients is  
granted by Knowledge Technology,  
provided that the base fee of \$3.00 per  
copy, plus \$0.25 per page is paid  
directly to the Copyright Clearance  
Center.

\*PC AI (ISSN 0894-0711) is  
published bi-monthly by

Knowledge Technology, Inc.,  
PO Box 30130,  
Phoenix, AZ 85046-0130

# Editorial

## Learning to Communicate

One of the goals of artificial intelligence is to bridge the gap between the world of computers and the world of human beings. Enabling information to pass freely and easily between those two worlds can lead to many benefits. However simple a concept that may seem to be, in practice it is a difficult feat to accomplish. As we all know from yelling at our computers, they are not terribly good listeners. Also, when our computers try to communicate with us, the messages can be so complex as to be of little use to the average computer user. For example, if you have ever received an error message and clicked on the "show details" button, the resulting details look more like a Scrabble game that got out of hand than a helpful diagnostic of the problem. Therefore, a large hindrance to information exchange lies in the inability to effectively communicate. There is hope, though. With artificial intelligence technologies that attempt to emulate human processes, the wealth of information that can be generated by computers becomes more accessible to humans.

One such technology that is bridging the information gap is neural networks. These networks of interconnected processing units mimic the way that neurons in the human brain work. Important connections are emphasized while less relevant connections are downgraded. Neural networks can recognize patterns and predict possible outcomes just like humans can - but with the advantage of increased speed and capacity for information. As I discuss in my article "Neural Nets and Scientific Research: A Match Made in AI Heaven," this fact makes neural networks an invaluable tool in facilitating scientific research.

Another technology is intelligent searching tools. Searching through vast amounts of information can be daunting, especially if queries are taken too literally. However, computers, by nature, take everything literally. They use mathematical algorithms to evaluate problems, and are thus governed by the rigidity of mathematics. But there are ways to create more efficient and pertinent information searches, as Elizabeth Thede details in her article "Indexed vs. Unindexed Searching: From Security Classifications to Forensics." She presents the differences between indexed and unindexed searching and discusses how these enable organizations and individuals to search smarter and faster.

In their article "The Visual Development of Rule-Based Systems," Charles Langley and Clive Spenser discuss another problem with successful man/machine communication - how information is represented. Most people are more likely to understand a concept if it is presented visually, whether it be through diagrams, demonstrations, or gestures. In terms of rule-based systems, the information has almost always been presented in a text-based form. The authors contend that rule-based systems will be more effective if knowledge is presented in a visual form and they discuss the generation of such a system.

In Terry Hengl's article, "Protégé, Ontology and Knowledge Acquisition: Knowledge Representation, the Foundation of Intelligent Systems" he discusses a tool called Protégé which is designed to create customized knowledge-based applications. It works on the principle of ontologies which are definitions of concepts in terms of a language understandable to all parties involved. Ontologies also delineate relations between individual concepts so as to further define their meanings. This makes sure that everyone is "on the same page" and that knowledge is fully developed and useful.

As always, *PC AI's* regular features are back. Test your knowledge of AI terms with the AI-Q crossword puzzle, learn about news in the artificial intelligence world with "AI and the Net," find a book or two to read in "The Bookzone," and discover new products with the "Product Update" and "Buyer's Guide." We hope you enjoy this issue of PC AI and learn something about the many intelligent ways that knowledge is conveyed in the information age.

**Ilana Marks**