



**Where Intelligent Technology
Meets the Real World**
www.pcai.com

Business Applications

**Keeping an A'I' Out for the
Environment**

**The State of AI Today:
Rediscovering Hidden
Technologies**

**Robotics: The Grand
Challenge is Coming!**

**Plus: AI and the Net,
Bookzone, Buyer's Guide,
Product Updates**

Also:
**Business Applications,
Business Rule Automation,
Computational Linguistics,
Data Analysis & Mining,
Forecasting,
Machine Translation,
Modeling & Simulation,
Natural Language
Processing,
Neural Networks,
Speech Recognition,
Web Based Expert
Systems,
Training,
AI Conferences,
and more!**



QMC TNA PROGRAM

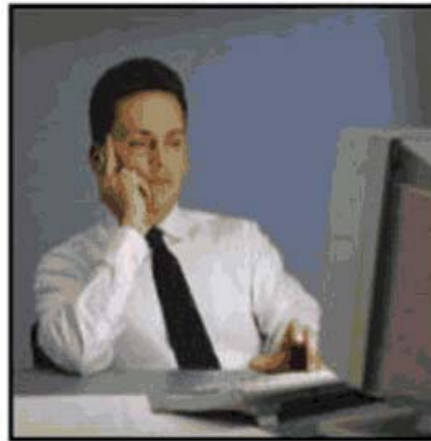
For Windows

The QMC Thermal Network Analyzer (TNA) Program is a differential equation analyzer for thermal, radiation, fluid flow, stress, and process systems using a finite difference numerical integration technique. Steady state & transient analysis are provided through an easy block and stream flow sheet graphical interface. The QMC TNA Program provides

thermal and fluid component design to full system performance. Based on the NASA SINDA methodology, graphical time dependent results provide solution techniques and accuracy for precise assessment and confirmation. Interfaces with MS Word & Excel. 100% satisfaction.

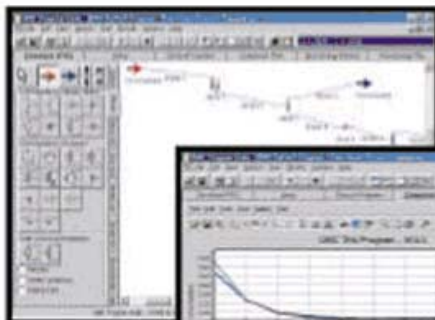
THERMAL NETWORK ANALYZER

- Process Design
- Process Control
- Optimization
- Reliability
- Simulation
- Sensitivity Studies
- Heat Transfer
- Power Generation
- Energy Systems
- Fire Protection
- Pipeline Systems
- Fluid Flow

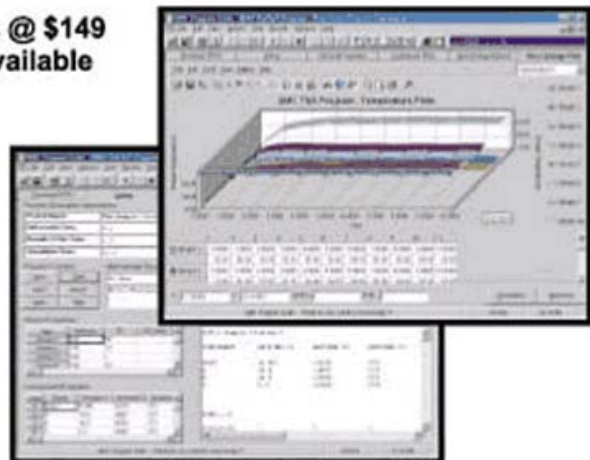
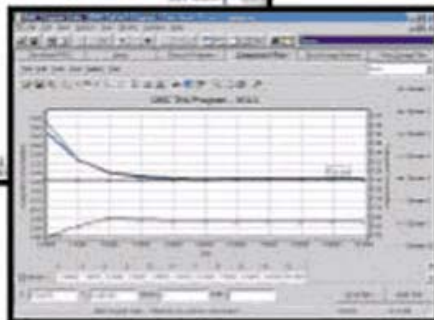


- Chemical
- Pharmaceutical
- Aerospace
- Petrochemical
- Automotive
- Pulp / Paper
- Refining
- Utilities
- Manufacturing
- Mechanical / Civil
- Electrical
- Agricultural

“WHAT DO YOU WANT TO SOLVE TODAY?”



Pricing starts @ \$149
Academic available



QUALITY MONITORING & CONTROL QMC@QMC.net 281.359.4471 www.QMC.net



Quantities Limited

**Buy PC AI Back Issues
A Great Resource
for AI Research**

**\$8.00/Issue - US
(For Us and Canadian and
Foreign Postage
contact PC AI or visit the
PC AI web site)**

**Order online at
www.pcai.com
Total amount enclosed
\$_____.**

**Send payment and
coupon to:
PC AI Back Issue Request
POB 30130 Phoenix AZ 85046**

Call PC AI at 602 971-1869

Name _____
Address _____
City _____ State _____
Zip _____

Visa/MC/Amer# _____

Exp. Date _____

Signature _____

Phone _____

E-mail _____

**For a complete summary of the back
issue contents visit:**

**Check out PC AI's 15 year cumulative
index at:**

http://www.pcai.com/web/indexes/Cumulative_index.html or

http://www.pcai.com/web/issues/back_issue_summary.html

1995

- 9 #1 Intelligent Tools
- 9 #2 Fuzzy Logic / Neural Networks
- 9 #3 Object Oriented Development
- 9 #4 Knowledge-Based Systems
- 9 #5 AI Languages
- 9 #6 Business Applications

1996

- 10 #1 Intelligent Applications
- 10 #2 Object Oriented Development
- 10 #3 Neural Networks / Fuzzy Logic
- 10 #4 Knowledge-Based Systems
- 10 #5 Genetic Algorithm & Modeling
- 10 #6 Business Applications

1997

- 11 #1 Intelligent Applications (Intelligent Web Search Engines)
- 11 #2 Object Oriented Development (Expert Systems on the Web)
- 11 #3 Neural Nets / Fuzzy Logic (Expert Systems)
- 11 #4 Knowledge-Based Systems (Data Mining)
- 11 #5 Data-Mining and Genetic Algorithm (Expert Systems)
- 11 #6 Business Applications (Neural Networks)

1998

- 12 #1 Intelligent Tools & Languages (Automated Agents)
- 12 #2 Object Oriented Development (Java Based AI)
- 12 #3 Neural Nets / Fuzzy Logic (Modeling)
- 12 #4 Knowledge-Based Systems (Modeling Methodology)
- 12 #5 Data Mining and Discovery (Knowledge Management)
- 12 #6 Business Applications (Neural Networks)

1999

- 13 #1 Intelligent Tools & Languages (Knowledge Verification)
- 13 #2 Rule and Object Oriented Development (Data Mining)
- 13 #3 Neural Nets & Fuzzy Logic (Searching)
- 13 #4 Knowledge-Based Systems (Fuzzy Logic)
- 13 #5 Data Mining (Simulation and Modeling)
- 13 #6 Business Applications (Machine Learning)

2000

- 14 #1 Intelligent Applications
- 14 #2 Intelligent Web Applications & Object Oriented Development
- 14 #3 Intelligent Web Portals, Neural Networks and Fuzzy Logic
- 14 #4 Knowledge Management, Expert Systems, Intelligent EBusiness
- 14 #5 Data Mining, Modeling & Simulation, Genetic Algorithms

2001

- 15 #1 Intelligent Applications
- 15 #2 AI Web Apps, OOD, AI Language
- 15 #3 Intelligent Business Rules & Fuzzy Logic (Petri Nets in Prolog, Knowledge for Sale)
- 15 #4 Knowledge Management and Decision Support (Brief History of AI)
- 15 #5 Data Mining, Modeling, Simulation and Analysis, Natural Language Processing
- 15 #6 AI to Combat Terrorism (Rule-Based Expert Systems, Hal - 2001, Multi-agent Network Planning)

Expand your possibilities, not your code

with Allegro CL[®] and Lisp.

Faster Development:

Evolve and adapt your application while it's running. Eliminate the "edit-compile-link-run-test" cycle.

Increased Productivity:

Maximize development efforts by taking advantage of programmable macros, automatic memory management and crash-proof bug-trapping.

Webify Seamlessly:

Deploy your application over the Internet with AllegroServe and other commercial web/app servers.

Easy Connectivity:

Integrate applications with a variety of Java, XML, COM/OLE, database and CORBA tools.

Fully Supported:

All licenses include one year's support. Lisp training classes and consulting also available.

Allegro CL helps you make the most of your code. Experience for yourself why many of today's most successful companies and top researchers won't use anything else.

Free trial copy!
Download yours today at
<http://www.franz.com/>
info@franz.com



AllegroServe is a trademark, and Allegro CL is a registered trademark of Franz Inc.

Table of Contents

18 Keeping an A 'I' Out for the Environment

Ilana Marks discusses some of the ways that AI is used to help protect and preserve the environment and agriculture industry. Examples presented in the article include the case of a thirsty tree and the problems of grasshopper invasion.



Page 18

24 The State of AI Today: Rediscovering Hidden Technologies

Elizabeth Lane presents the first in a series of articles discussing the current state of AI. The article focuses on how AI has been so well integrated into everyday activities that it almost becomes invisible to the people using it.



Page 24

30 Robotics: The Grand Challenge is Coming!

Rob Costi discusses the second annual DARPA Grand Challenge off-road autonomous vehicle race. The article recaps the results of last year's race and details the upcoming qualification round for this year's race, as well as rules and regulations that entrants must follow. Ladies and Gentlemen - start your engines!



Page 30

Columns

45 Book Zone

- *Algorithmic Learning in a Random World
- *Fuzzy Models and Algorithms for Pattern Recognition and Image Processing
- *Artificial Intelligence Methods and Tools for Systems Biology
- *Building Intelligent .NET Applications
- *Mining Imperfect Data
- *Machine Learning Applications in Software Engineering
- *Handbook of Integrated Risk Management for E-Business

Ilana Marks

52 Buyer's Guide

Business Applications, Business Rule Automation, Computational Linguistics, Forecasting, Machine Translation, Natural Language Processing, Web Based Expert Systems

Regular Features

7 Editorial

8 Product Update

Data Mining, Intelligent Tools, Modeling and Simulation, Natural Language Processing, Neural Networks, Speech Recognition, Training, AI Conferences

35 AI-Q Crossword Puzzle

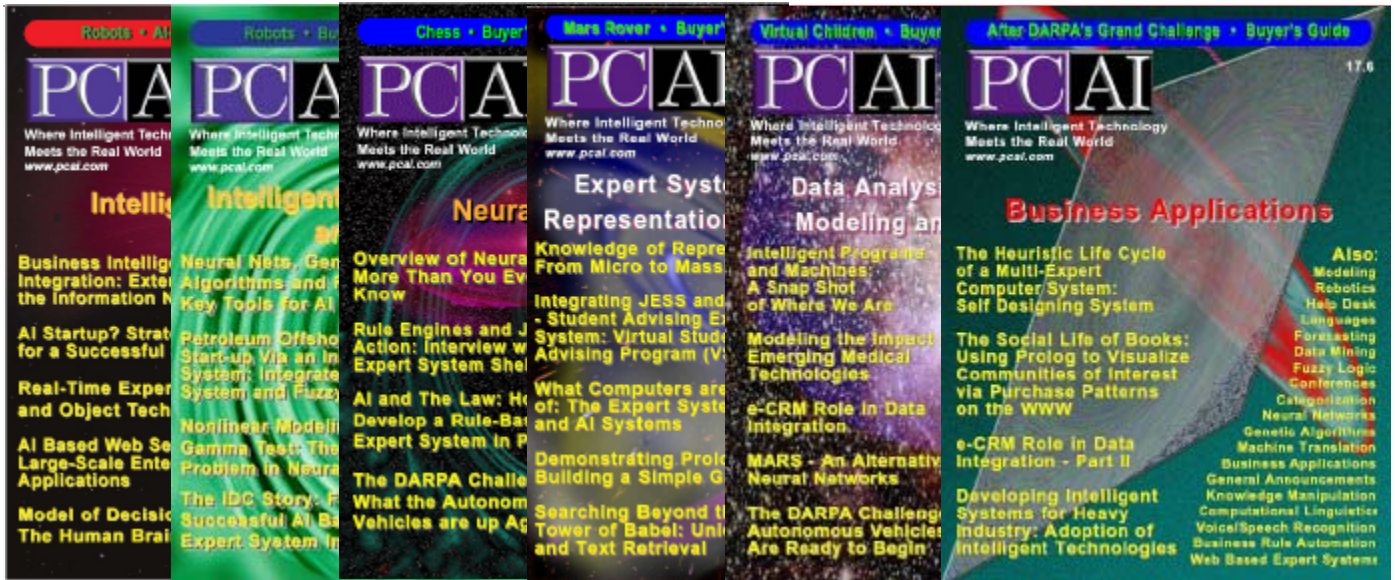
Natural Language Processing

39 AI and the Net

Search Engine Semantics, Walking Assistance Suit, Another Chess Challenger, Self-Replicating Robots and more.

Ilana Marks

65 Classifieds and Recruiting



PC AI Volume 17 now on CD

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.*

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

Topics include:

*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**

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

Coming Soon!

PC AI Volume 18 CD

Get all 6 issues of PC AI Volume 18 on one
convenient CD.

Articles include: Systems Analysis & RAD,
Microarrays and AI, Indexed vs. Unindexed
Searching, Expert Systems in Medicine, and
much more. Plus, regular columns AI and
the Net, The Bookzone and Robotics, as well
as the PC AI Product Update and Buyer's
Guide.

The approximate release date will be
announced on www.pcai.com/store, so
check back often!



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

Ilana Marks

Elizabeth Lane

Rob Costi

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
www.pcai.com

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

Entire contents copyright ©2005 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

A Technological Game of Hide-and-Seek

Modern technology is on a course where it becomes smaller and smaller with every passing year. That's not to say that its influence is becoming smaller - in fact, as the size of the programs and tools decreases, the more reliant we become on them. The ease with which the everyday person can use a particular program is the bellwether for success - and the average computer user has a computer with average processing speed and memory. Therefore, technology companies are always looking to streamline their products in order to make them a commercial success. If a single computer still filled up an entire room, the likelihood of finding computers in even a small sampling of households would be slim to none. However, the increasingly small size of computers today allows them to be accessible to everyone. But, on the other hand, widespread use of computers has created an entire generation of people that look upon computing as something entirely unspectacular. They don't remember the days when people used to do a lot of legwork in order to find information. The point is that when something has become so integrated into everyday life, it tends to "disappear." It disappears not in a physical sense but rather in a psychological sense. Think about it, when's the last time you opened up the refrigerator and stood there in the doorway marveling over the physics behind the technology keeping your food cold? It probably wasn't anytime recently.

The same thing is happening to artificial intelligence technologies. Increasingly, AI technologies are integrated into mainstream and useful products that people use everyday. The AI has become so streamlined as to become invisible. So, by outward appearances, it looks like AI might be suffering from a lack of publicity - but who really needs publicity when everyone is using the technology already? In fact, in the case of AI, it is almost better that the average computer user doesn't realize that they have come into contact with it. That means that AI is steadily reaching its goal of successfully emulating the human experience.

In this issue, we present articles that reveal AI's many useful applications. In "Keeping an A'T Out for the Environment," Ilana Marks discusses how AI is helping to preserve the environment, which is something from which everyone on Earth can benefit. Ilana presents several cases where AI has proven to be beneficial. One of which is in the case of a particular type of tree that tends to wipe out other desert tree and shrub species by hogging the water supply. Because an ecosystem thrives when species are diverse, researchers wanted to limit the growth of this tree. Read the article to find out how scientists in affected areas are using AI to help alleviate the problem of this pushy tree.

Also in this issue, PC AI presents the first article in a series on the state of AI in the 21st Century. In the article, "The State of AI Today: Rediscovering Hidden Technologies," Elizabeth Lane reveals some of the current applications of AI technology that have a bearing on everyday people. One of these technologies is business rules. You would be hard-pressed to find a large company today that does not use this technology and yet, to the customers of these companies, the presence of the technology is never overtly sensed. Customers just know that companies are operating more smoothly. The benefits of a streamlined company are passed along in savings and better service to the consumer.

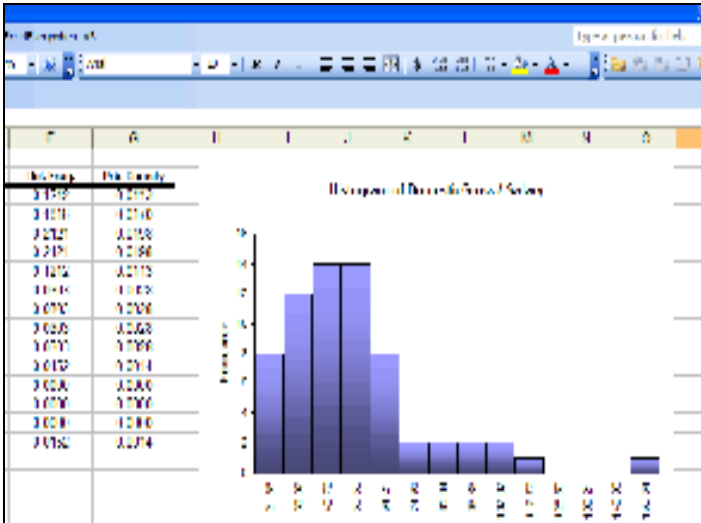
In this issue, you will also find the Robotics column, this time focusing on the upcoming DARPA Grand Challenge - an off-road "race" with a twist - the vehicles in the race have no human driver. Also, regular features such as AI and the Net, The Bookzone, and the PC AI Buyer's Guide are back again to detail AI news and the latest products and books.

So, close your eyes, count to ten, and yell "Ready or not, here I come!" Then read through this issue of PC AI and discover where that elusive AI has been hiding. Enjoy!

Ilana Marks

Product Updates

Data Mining



Microsoft Excel Add-in Update

Palisade Corporation released Version 1.1 of StatTools. Updated features include: Pareto charts to view and rank the differences among datasets; new regression routines;

and updated integration with Microsoft Excel. In StatTools Pro, VBA support for Nonparametric analysis pack has also been added. Datasets and variables do not need to be in the same workbooks or worksheets, data can be organized in a logical fashion and analyses can be run based on variables, rather than utilizing the functions within Excel. The new Version 1.1 is available online to current StatTools users as a free update at www.palisade.com/html/update.html

Palisade Corporation

www.palisade.com/html/stattools.asp

Unstructured Data Solution

Kaidara Software, Inc. announces the release of Text2Data Version 3, a tool used with Kaidara Advisor to convert unstructured or semi-structured data sources into a knowledgebase. The new features provide text mining and data modeling capabilities for retrieval and reuse of unstructured information to expand knowledge bases utilized to diagnose and solve customer support problems. Extracts values and indexes text with defined domain concepts rather than everyday language to add structure and meaning to textual



NEW Version 7 Terabyte Indexer

The Smart Choice for Text Retrieval® since 1991

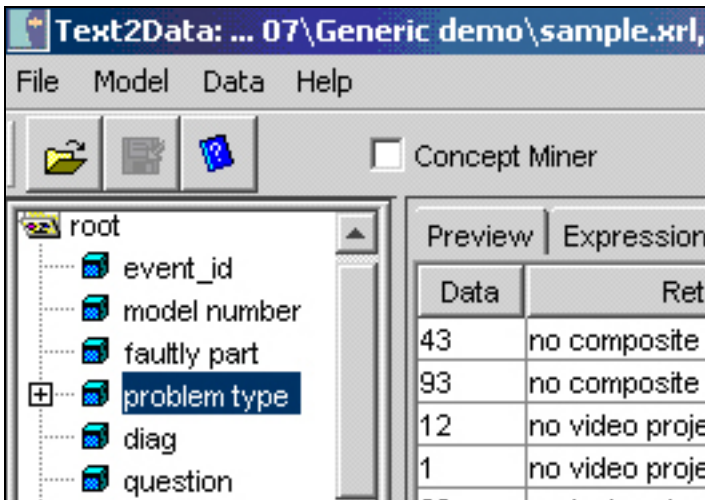
- ◆ over two dozen indexed, unindexed, fielded & full-text search options
- ◆ **highlights hits** in HTML, XML and PDF while displaying embedded **links**, formatting and **images**
- ◆ converts other file types (word processor, database, spreadsheet, email, ZIP, Unicode, etc.) to HTML for display with **highlighted hits**

Reviews of dtSearch

- ◆ "The most powerful document search tool on the market" — *Wired Magazine*
- ◆ "dtSearch ... leads the market" — *Network Computing*
- ◆ "Blindingly fast" — *Computer Forensics: Incident Response Essentials*
- ◆ "A powerful arsenal of search tools" — *The New York Times*
- ◆ "Super fast, super-reliable" — *The Wall Street Journal*
- ◆ "Covers all data sources ... powerful Web-based engines" — *eWEEK*
- ◆ "Searches at blazing speeds" — *Computer Reseller News Test Center*

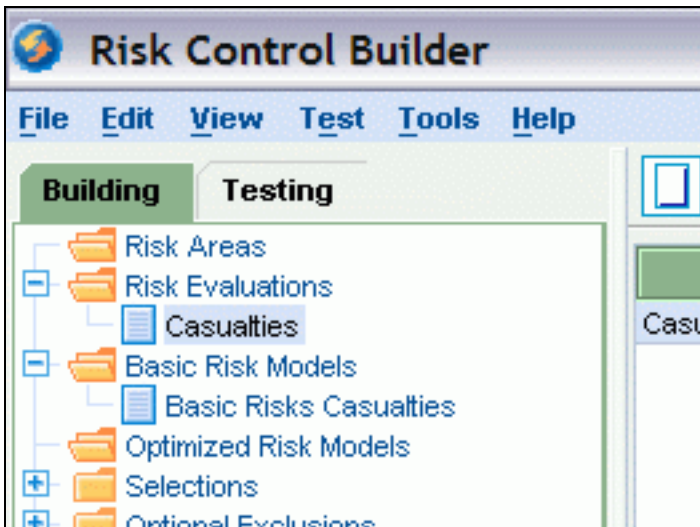
See www.dtsearch.com for hundreds more reviews & case studies

1-800-IT-FINDS • www.dtsearch.com



information. Text is mined directly to locate concepts and discover syntactic variations and synonyms useful in a data model. Information can be exploited to find similarities between situations, issues and questions for accurate knowledge capture and retrieval of answers from a repository of possible solutions, resolving the problem of inconsistent vocabulary when reporting customer issues. Enriches textual material so it can be analyzed with standard reporting tools and statistical techniques for decision-support. Using reporting tools and analytic methods, customers identify common patterns such as the frequency of a problem or the most effective path to problem resolution. Data can uncover product design problems and identify future customer requirements such as required spare parts.

Kaidara
www.kaidara.com/



Solution for Fighting Insurance Fraud
 SPSS Inc. announces PredictiveClaims, a new solution designed to reduce insurance fraud, enhance the claims process and decrease costs. Based on real-time predictive analytic technology, the application integrates with existing

claims-management systems to evaluate the legitimacy of requests against risk profiles and external fraud databases. The application combines and analyzes data from multiple sources; including federal and insurance industry databases. Accident descriptions, and other textual claim data, often contain indicators of fraudulent behavior. After running through the system, a claim is approved or tagged for further investigation. “Smart” questions encourage claim handlers to ask customers for critical, relevant information that can confirm the likelihood of fraud. Legitimate insurance claims pass through the system quickly to minimize loss adjustment expenses and claim handling costs, as well as increase customer satisfaction. Visit www.spss.com for more information.

SPSS Inc.
 1.800.543.2185
sales@spss.com
www.spss.com



Inference without THE ENGINE

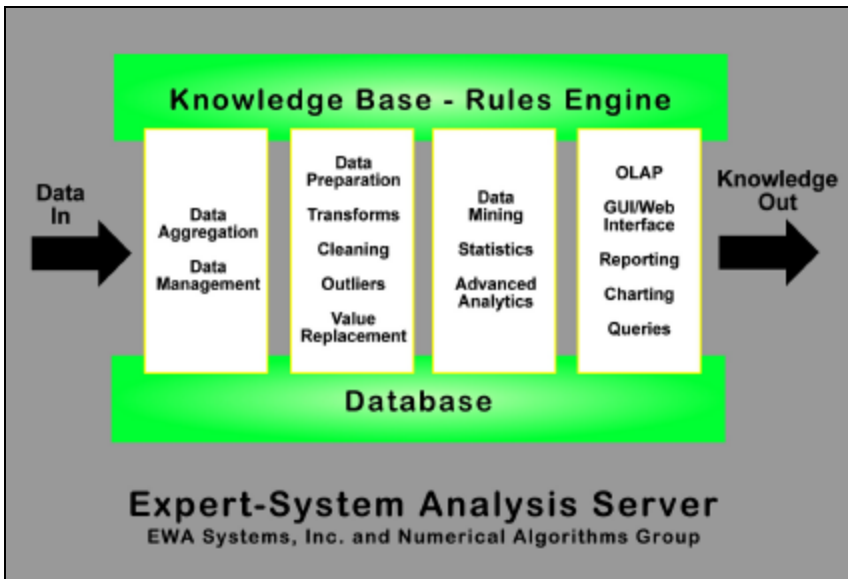
EZ-Xpert 3.0

Features:

- Warp Speed - Test over 20,000 rules per second
- Fast Development - Easy to learn, create hundreds of rules a day
- No need to write code
- 23 Verification Criteria insure accuracy

Get the EZ solution today!

AI Developers, Inc.
 Phone: (888) 327-9397
info@ez-xpert.com
www.ez-xpert.com



program can be found at www.nag.com/bdu/consultingpartners.asp which allows IT consulting firms to utilize NAG's mathematical and statistical software components and expertise to build analytical applications. A representative package includes software as well as technical, marketing and support at actual prospective client meetings. The fee is determined by who originates the assignment, in many cases with no cost to the consultant. Contact NAG for more information.

Numerical Algorithms Group (NAG)

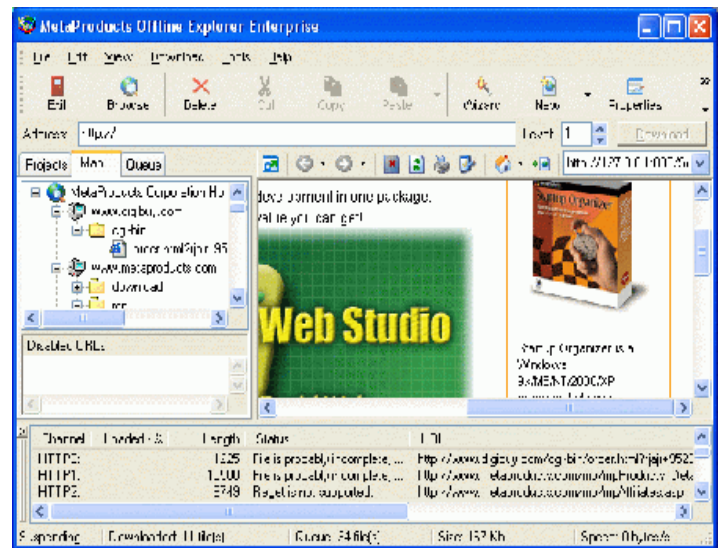
www.nag.com

EWA Systems

www.ewasystems.com

NAG Consulting Partners Program

Numerical Algorithms Group (NAG) and EWA Systems announce a partnership to create hybrid data mining solutions for finance, e-commerce and semiconductor manufacturing industries. The mutual endeavor combines NAG's procedural language-based mathematical and statistical computing utilizing C and Fortran with EWA's object-oriented language-based data mining algorithms in Java and C#. NAG is planning several consulting partner collaborations this year, EWA being the first. More information on the



Off-line Data Mining

MetaProducts Corporation announces Offline Explorer Enterprise v. 3.8, a Windows research and analysis tool for working off-line with downloaded Internet directories, files, video and audio streams, and web sites. An OLE Automation interface allows extensions in Visual Basic, C++, Delphi or MS Office VBA. A server with 2GB of RAM may download and process up to 100 million HTTP, HTTPS, FTP, RTSP, PNM and MMS URLs per session; 20 million on a server with 512MB. Supports JavaScript, Java Classes, Cascading Style Sheets, Macromedia Flash/Director/Authorware, XML/XSL/RSS/VRML, Adobe Acrobat (PDF), WAP, streaming SMIL/ASX/RAM/NSC and Table of Contents files to extract links from Web pages and allow off-line seamless browsing. Project trees contain nested folders and a separate download directory for project folders with the ability to keep old copies of loaded files and a downloading queue tab. Provides HTTPS protocol support for downloading from secured web sites. Supports streaming downloads and

eclipse +

With Eclipse:

- World class, multi-platform, extensible development environment
- Source code debugging for Prolog logicbases running in other programs and on remote (Web) servers
- Code outlines and project cross references
- Team development tools

You Can:

- Automate the logical rules and relationships that run an organization
- Develop integrated logic base components
- Use professional development tools and methodologies
- Customize knowledge representation and reasoning engines for individual application needs
- Apply advanced ontology concepts and develop semantic web applications

With Amzi!:

- World class, multi-platform, extensible Logic Programming tools
- ISO Standard
- High performance for 24/7 server deployment
- Large logicbase support
- Integrates seamlessly with Java/JSP, .NET, C#, VB, C++, Delphi and more

Download

www.amzi.com

evaluates and downloads scripted sites. Internal, tabbed HTML editor has syntax highlighting for HTML, CSS and Javascript. Compresses and exports sites in HTML Help File (.CHM) format. In-depth tutorials and links assist users. Downloaded projects can use your default Internet browser or the product's internal browser to view downloaded Web sites off-line. Downloaded web pages and files receive relative names to move information to a different hard drive, CDROM, or removable disk. Creates MHT files, prints entire sites and searches keywords across all downloaded web sites. Supports MMS, PNM and RTSP stream downloads; record video and audio streams to the hard drive for later screening with MS Media Player or Real Player. Parses and processes NSC files from Microsoft's NetShow channel and RealPlayer's SMIL files. Maintains and supports RealPlayer authentication to load password-protected streams. Duplicate project templates, specify files types and web levels, drag and drop links. Provides an OLE Automation interface for extensions in Visual Basic, C++, Delphi or MS Office VBA to customize or enhance performance. Includes sample files in Visual Basic, C++ and Delphi and help files on objects, properties and methods. Trial versions available at www.metaproducts.com/download/eeset-up.exe.

MetaProducts Corporation:
www.metaproducts.com

Intelligent Tools

CORVID 3.2

Exsys Inc. announces the release of version 3.2 of their flagship knowledge automation expert system software, Exsys CORVID®. The latest version makes it easier to build the logic of problem-solving systems including new ways to control backward chaining. In the new version, variable names are not limited to English characters, improving support for other languages. CORVID 3.2 includes powerful string and date manipulation, and it is now easier to build systems using statistical expressions and membership function Fuzzy Logic. The CORVID runtimes have the ability to obtain information on Java system properties allowing a system to modify itself based on the environment it is being run in. The CORVID Servlet Runtime has new options for templates and graphic activations. A new alias option allows the expert system to be started without revealing anything about the server file structure. The new Servlet Runtime is more efficient in its use of memory to save state between questions. In addition, there are enhanced compatibility functions between CORVID and Exsys RuleBook® development environments. Systems built with Exsys RuleBooks use the same Runtime pro-



NEW Version 7 Terabyte Indexer

The Smart Choice for Text Retrieval® since 1991

- ◆ over two dozen indexed, unindexed, fielded & full-text search options
- ◆ **highlights hits** in HTML, XML and PDF while displaying embedded **links**, formatting and **images**
- ◆ converts other file types (word processor, database, spreadsheet, email, ZIP, Unicode, etc.) to HTML for display with **highlighted hits**

Reviews of dtSearch

- ◆ "The most powerful document search tool on the market" — *Wired Magazine*
- ◆ "dtSearch ... leads the market" — *Network Computing*
- ◆ "Blindingly fast" — *Computer Forensics: Incident Response Essentials*
- ◆ "A powerful arsenal of search tools" — *The New York Times*
- ◆ "Super fast, super-reliable" — *The Wall Street Journal*
- ◆ "Covers all data sources ... powerful Web-based engines" — *eWEEK*
- ◆ "Searches at blazing speeds" — *Computer Reseller News Test Center*

See www.dtsearch.com for hundreds more reviews & case studies

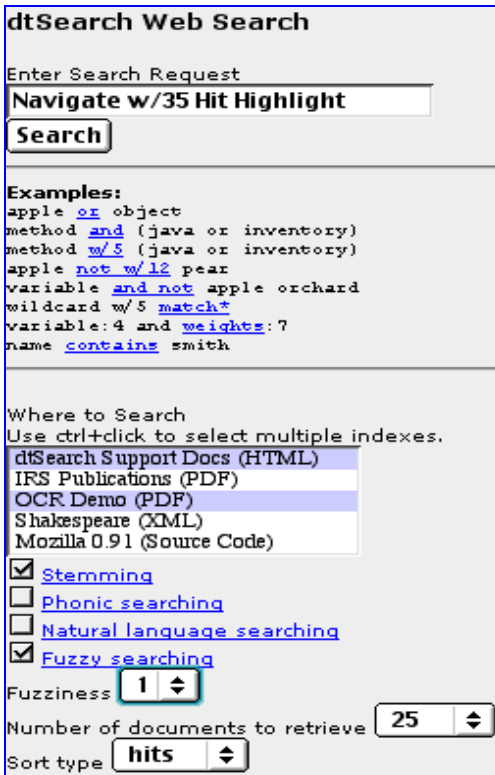
1-800-IT-FINDS • www.dtsearch.com

grams as Exsys CORVID and are upwardly compatible with CORVID.

EXSYS Inc.
info@exsys.com
www.exsys.com

Terabyte Text Indexer

dtSearch Corp. announces Version 7 of its product line with the ability to search terabytes of text on a desktop, network,

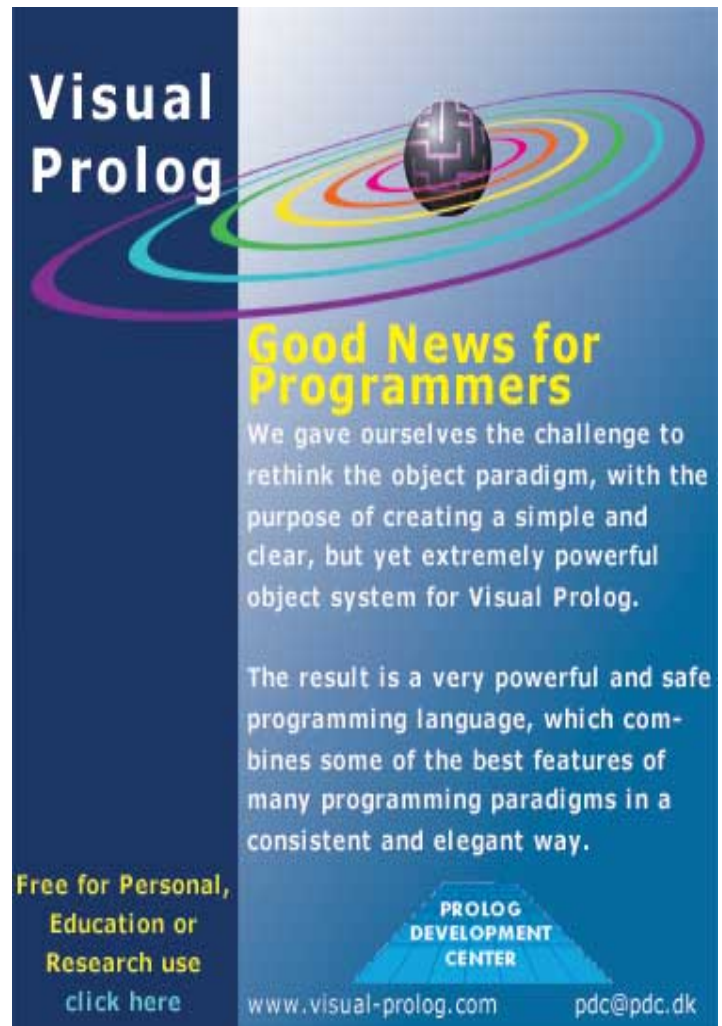


Internet or Intranet. dtSearch Web with Spider, Desktop with Spider, Network with Spider, Publish and the Text Retrieval Engine index over a terabyte of text in a single index with a search time of less than a second. All products contain over two dozen indexed, unindexed, full-text and fielded data search options

to highlight hits to be displayed in HTML, XML and PDF files, as well as built-in HTML converters for display of other documents from databases, spreadsheets, email (including attachments), etc. The dtSearch Spider, embedded in several products, integrates searching Web site content with local data allowing an index and search of dynamically-generated content, such as ASP/ASP.NET, MS CMS, and MS SharePoint. Links can follow a vertical or horizontal path within a public or secure HTTPS web site as well as password protected and forms-based authentication sites. Integrated relevancy-ranking includes WYSWYG display of Web-ready content with highlighted hits. dtSearch Web publishes instantly searchable data to an Internet or Intranet site, with Spider functionality. dtSearch Engine adds built-in file format support and searching to applications including SQL, Delphi, Java, C++, C++.NET, C#, VB.NET and ASP.NET. dtSearch Desktop and dtSearch Network search files on a PC and across a network, running in a client/server capacity. dtSearch Publish distributes a searchable document collection to CD, DVD or similar media and mirrors an existing Web site on CD/DVD so the resulting applica-

tion can run without being installed on the hard drive. Options included in all products: adjustable fuzziness from 0 to 10 (for typographical and spelling errors), synonym/concept /thesaurus, Boolean (and/or/not), natural language relevancy ranking (by hit term frequency, density and rarity), positional scoring ranking, phrase, phonic, wildcard, bilateral proximity, directed proximity, stemming, numeric range, user-defined variable term weighting, and international language support through Unicode. Forensically-oriented features include: automatic parsing of text segments in large data blocks, such as those recovered through an "undelete" process, from unallocated computer space, or from partially recovered file fragments; language recognition algorithms for detecting text in a large variety of languages (Western European, other European, Middle-Eastern, etc.); proprietary filtering algorithm to scan recovered data blocks using multiple text encoding detection methods; and automatic recovery of text from corrupt forensically-retrieved documents. For more information and evaluation versions call 1-800-IT-FINDS, or visit www.dtsearch.com.

dtSearch Corporation
www.dtsearch.com



Visual Prolog

Good News for Programmers

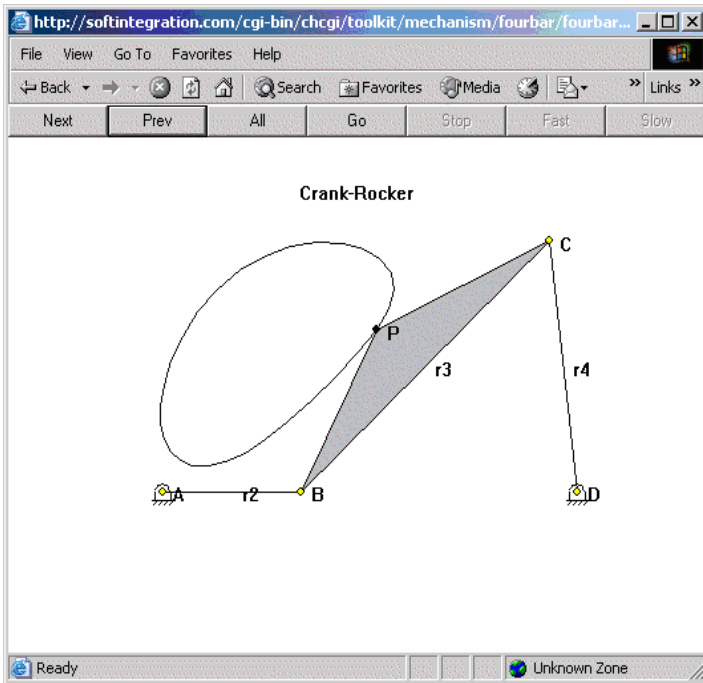
We gave ourselves the challenge to rethink the object paradigm, with the purpose of creating a simple and clear, but yet extremely powerful object system for Visual Prolog.

The result is a very powerful and safe programming language, which combines some of the best features of many programming paradigms in a consistent and elegant way.

Free for Personal,
Education or
Research use
[click here](#)



PROLOG
DEVELOPMENT
CENTER

www.visual-prolog.com pdc@pdc.dk



Ch Mechanism Toolkit 1.5

SoftIntegration, Inc. announces the release of Ch Mechanism Toolkit 1.5 for mechanism design and analysis. It contains many mechanism classes and objects for design


+


<p>With Eclipse:</p> <ul style="list-style-type: none"> World class, multi-platform, extensible development environment Source code debugging for Prolog logicbases running in other programs and on remote (Web) servers Code outlines and project cross references Team development tools <p>You Can:</p> <ul style="list-style-type: none"> Automate the logical rules and relationships that run an organization Develop integrated logic base components Use professional development tools and methodologies Customize knowledge representation and reasoning engines for individual application needs Apply advanced ontology concepts and develop semantic web applications 	<p>With Amzi!:</p> <ul style="list-style-type: none"> World class, multi-platform, extensible Logic Programming tools ISO Standard High performance for 24/7 server deployment Large logicbase support Integrates seamlessly with Java/JSP, .NET, C#, VB, C++, Delphi and more
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Download

www.amzi.com

Visit the PC AI Store
to order
Back Issues, one of the
best resources for
information on
Artificial Intelligence

www.pcai.com/store

and analysis of commonly used mechanisms such as four-bar linkage, five-bar linkage, six-bar linkage, crank-slider mechanism, and cam-follower system. Ch Mechanism Toolkit is based on C/C++ interpreter Ch. This new release supports Ch Mechanism Toolkit in Windows, Mac OS X, Linux, Solaris, HP-UX. Toolkit comes with the source code and examples. It can help you develop solutions for design and analysis of many other mechanisms. Features of the toolkit include kinematic analysis, dynamic analysis, and plotting utilities. The Ch Mechanism Toolkit costs \$199 for academic use and \$899 for commercial use. Contact SoftIntegration for more information.

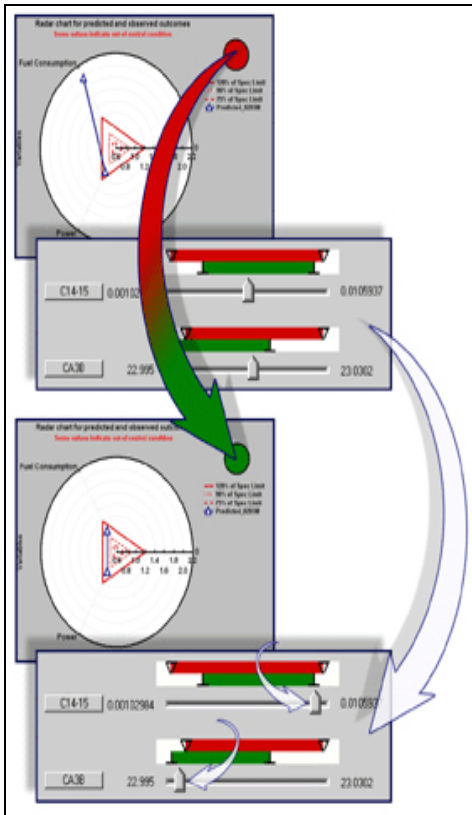
SoftIntegration, Inc.
info@softintegration.com
www.softintegration.com

Modeling and Simulation

Manufacturing Process Intelligence Software

Caterpillar Inc. and StatSoft Inc. announce the release of PROCEED, a software solution to model, optimize, and simulate manufacturing processes. PROCEED software integrates Caterpillar's analytic processes with the *STATISTICA* suite of enterprise analytics software. Manufacturers derive and validate causal relationships between processes

Next Issue's Theme is:
Intelligent Applications
with a focus on Data
Mining, Business
Intelligence, Robotics, and
Computational Intelligence



and outcomes and deploy information for comparisons of scenarios and optimization. Incorporates a set of graphical tools, the Actionable Design Environment, to simulate process models and manipulate what if scenarios to view outcomes in a graphical display. Models associations between manufacturing process parameters and outcomes using historical data or minimal

information to research processes and optimize outcomes. Optimizes production processes to search for the best solution utilizing multiple requirements. Designed for multi-step manufacturing processes and processes where modeling is difficult and resources are not available to originate and conduct experiments. Contact the vendors for further details.

Caterpillar Inc.
www.cat.com

StatSoft Inc.
info@statsoft.com
www.statsoft.com

SimPowerSystems 4

The MathWorks announces SimPowerSystems 4, which enables engineers to use Model-Based Design to model and simulate electrical circuits and power systems within Simulink. Includes new application libraries, including electric drives, flexible AC transmission systems (FACTS), and distributed resources. New libraries contain more than 150 blocks distributed in eight sub-libraries, including electric sources, electric machinery, and three-phase components. Libraries represent both simple and complex electric components, such as resistors, inductors, capacitors, and AC and DC electric drives. Available for Windows, UNIX/Linux, and Macintosh platforms. Prices start at \$3,000.

The MathWorks
www.mathworks.com

Build more powerful,
 scalable applications
 with
Allegro CL
 and **Lisp**

Webify Seamlessly
 Deploy applications over the
 internet with AllegroServe and
 other web/app servers

Easy Connectivity

Integrate applications with a
 variety of Java, XML, database,
 CORBA and COM/OLE tools

Get to market *on time* and
on budget with
 Allegro CL and Lisp.

Find out why so many
 leading companies & top
 researchers won't program
 with anything else.

Free trial download!
www.franz.com

AllegroServe is a trademark, & Allegro CL is a registered trademark
 of Franz Inc. Copyright 2002 Franz Inc. All rights reserved.

StatTools Excels at Statistics.

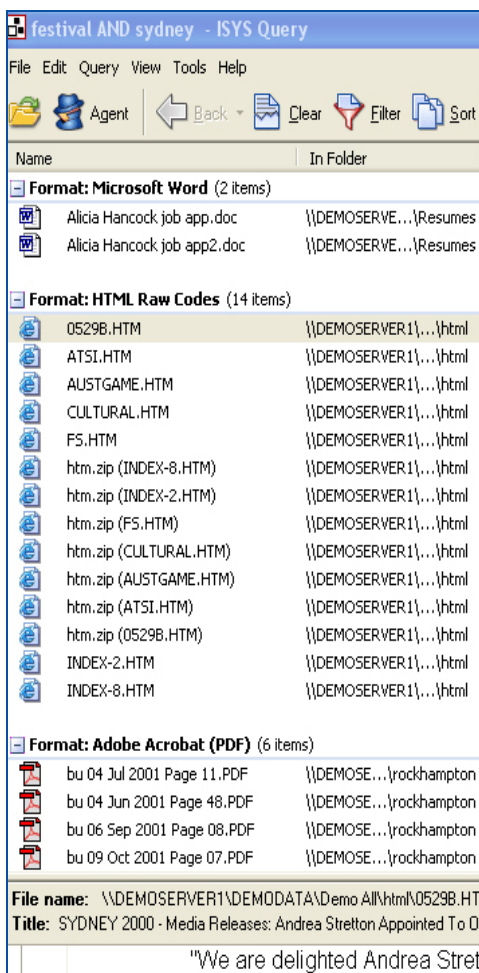


With No Learning Curve.

If you know Excel, you can use StatTools. StatTools from Palisade Corporation is an Excel add-in that replaces Excel statistics functions with an accurate, proven toolset. Get expert statistics where you need them. Save time, effort, and money. And you can easily create customized statistical procedures using Excel's built-in VBA language.

Download a free trial version at www.palisade.com/pcaist today.

Order StatTools and save \$250! Use code PCAI2005 at www.palisade.com/pcaist or when calling 800-432-RISK or 607-277-8000. In Europe call +44 (0)20 7426 9950.



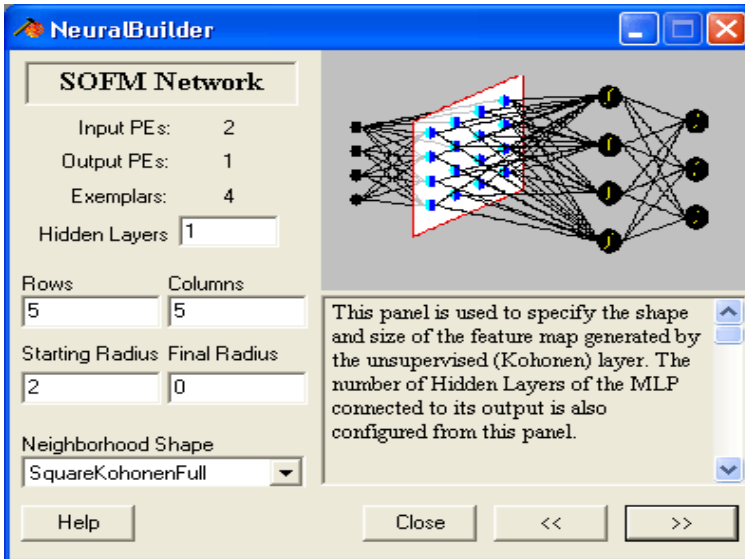
Enterprise Search Software ISYS Search Software announces the release of ISYS: 7, an enterprise search platform. New features to the ISYS 7 suite include On-The-Fly Categorization with automatic category generation based on the query. Categories can also be modified by administrators based on business rules. Results can be clustered into logical groups such as file type, relevance, number of hits, etc. Users

can weight hits in meta fields more than hits in full text using an "espin" operator or administrators can use scripting tools to inject metadata into content. A taskbar search window has been added for entering queries or accessing saved searches and indexes. Another new feature is the use of a hot key "WindowsKey + Q" to initiate a search by highlighting text. Administrators can create unlimited indexes and chain up to 128 of them allowing users to search across up to 8 billion documents in a single search. Enterprises can use multiple processors to build indexes in tandem. ISYS' Unicode support enables a single query search across multiple languages. ISYS:desktop 7 is available immediately.

ISYS Search Software
www.isys-search.com/

Looking for those technical articles you missed in any of our previous years? Visit PC AI and search through 16 years of back issues.
www.pcai.com

Neural Networks



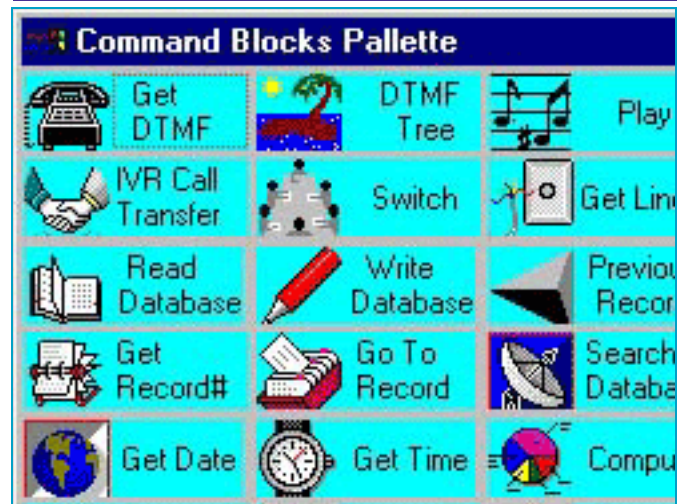
Levenberg-Marquardt Second-Order Learning Algorithm

NeuroDimension Inc. announces version 5.0 of their suite of development tools: NeuroSolutions, NeuroSolutions for Excel, and the Custom Solution Wizard. NeuroSolutions now includes

the Levenberg-Marquardt second-order learning algorithm and double precision floating point values. A Data Manager has been added to import data from Access, Excel or text files which can be processed before loading into the Breadboard within NeuroSolutions or creating a neural network. NeuroSolutions for Excel trains a network multiple times, removing subsets of data for testing. The final results are combined into a single report which retrains the model a final time. NeuralExpert technology is not included to allow neural networks based on problem types. A free evaluation copy of NeuroSolutions v5.0 is available for download from www.neurosolutions.com.

NeuroDimension, Inc.
www.nd.com

Speech Recognition



Modular Interactive Voice Application

iVoice, Inc. announces the 3.0 release of its Interactive Voice Response (IVR) Application Generator 3.0 with an enhanced Rapid Development Visual Environment (RDVE). The iVoice IVR generates custom applications in a visual platform with “drag” and “drop” commands to produce applications with speech recognition, text-to-speech and telephony features. The Speech Enabled IVR application is a modular architecture with the main IVR program controlling multiple applications. The IVR application generator allows automatic call routing and launches applications based on the number dialed by a caller. Answer Command Block manages incoming calls by allowing the start of a script before the call is actually answered. Caller ID Name provides an option to ANI/DNIS command block to return caller ID name to verify, confirm and manage call routing. Product now includes an outdialing capability and multi-lingual capabilities. Stored SQL procedures can be called from with-

Continued on Page 50

Visual Prolog

Good News for Programmers

We gave ourselves the challenge to rethink the object paradigm, with the purpose of creating a simple and clear, but yet extremely powerful object system for Visual Prolog.

The result is a very powerful and safe programming language, which combines some of the best features of many programming paradigms in a consistent and elegant way.

Free for Personal,
Education or
Research use
[click here](#)

PROLOG
DEVELOPMENT
CENTER
www.visual-prolog.com pdc@pdc.dk

Keeping an A'I' Out for the Environment

By Ilana Marks

Introduction

Sit back and think for a moment - when was the last time you spent any quality time outdoors? For many of us, it has been quite a while. With the increasing presence of advanced technology in everyday life, much of our daily business is conducted indoors. In fact, sometimes I wonder if there is an invisible 10 foot tether anchoring me to my computer! For this reason, it is easy to forget that there is a living environment right outside our doors that persists regardless of whether or not we notice it. Over time, however, inattention becomes detrimental. As a parallel, imagine that you cut yourself rather deeply with a kitchen knife. You decide there is no need to pay attention to it, so you leave it alone. You don't clean the cut; you don't see a doctor for any kind of treatment. In just a matter of time, the relatively small cut will become a larger problem when bacterial infection sets in. Similarly, inattention to small problems in

the environment today will explode into larger, more pressing problems in the future.

So, what should we do? We certainly can't change the fact that technology is an important part of life and that there are many other concerns and stresses that often take precedence in life. Well, why not put technology to use on behalf of the environment? Artificial intelligence technologies are excellent at recognizing and revealing issues as well as predicting outcomes. Therefore, it seems that AI is the perfect means of monitoring the environment and determining what needs to be done to keep it healthy for generation after generation. So, in that spirit, this article discusses the applications of AI technology in environmental preservation.

"Hostile" Takeover

One thing that is vital to the health of an ecosystem is the balance of vegetation and wildlife. When that balance is thrown off by the introduction of new species,

the ecosystem often suffers. What may be perceived as an immediate benefit can turn around and destroy an ecosystem. Many people are aware of the problems Australia has had with the introduction of rabbits. As you know, rabbits multiply like, well, like rabbits! Of course, rabbits must also eat so they began consuming native plants. For the native creatures, it was like waiting in a buffet line behind millions of pushy eaters. Therefore, many native creatures could not compete and faded into extinction. While this may initially seem relatively inconsequential, the upset balance should be considered. These native species were well-adapted to their environment and had an important place in the food chain. Consequently, not only did the rabbits affect the extinct species, they also affected the entire ecosystem and created a host of problems for Australian life including increased erosion, decreased fertility of the soil, and a lack of food for commercial

livestock.

Not every invasive species is an animal. Plants can also be invasive. At first glance, it may be difficult to imagine that something which doesn't move or graze would have an effect on surrounding populations. However, plants do take up space and consume resources. If you have ever planted a garden (or have ever seen a garden) you know that spacing between plants is crucial. You don't want the root systems to coincide or else the plants will be competing for the same resources in the soil. In addition, gardening books will give you oodles of guidelines about what types of plants should be planted together and what should be kept apart. All of this is in an effort to create a well-balanced garden that will require the least amount of effort from the gardener. If someone comes along later and plants eggplants right in the middle



Figure 1: A stand of Tamarisk, or Salt Cedar Trees growing along the Little Colorado River.

of your garden, however, you won't have a diverse garden so much as an eggplant patch.

That brings us to a particular case of a plant invader - the Tamarisk (See Figure 1). The

Tamarisk, or salt cedar was introduced to the United States about 200 years ago. Initially, it was used as an ornamental shrub. Soon, however, people realized that the Tamarisk had a very deep and

Get the right answers to the right people at the right time.

Don't just dish out data... Make your web site "smart" with expertise access!

EXSYS knowledge automation software and consulting services capture the decision-making processes of experts in interactive online systems, which deliver individualized answers to prospects, customers and employees whenever and wherever needed.

Accessible 24/7, Exsys CORVID® interactive systems replicate "consultations" with your top-level experts. They can shorten sales cycles, assure compliance, improve customer and product support, handle routine tasks, analyze data streams, simplify reporting, and tackle many business "points of pain".

Contact an EXSYS rep today to find out how.



New ver. 3.2
Go to Exsys Site for
Demos and Case Studies
Download FREE
30-Day Evaluation with Tutorial

EXSYS[®]
Expertise at Your Fingertips
www.exsys.com
+1.505.888.9494

extensive root system which would make it ideal to plant alongside rivers to minimize erosion. Settlers in the southwest US planted the trees along the Colorado River. Over time, the trees spread through New Mexico and Texas. The trees spread so easily because Tamarisk is very hearty and can easily disperse seeds using the wind. In addition, they can also thrive in areas where the soil is very salty because they excrete the excess salt through their leaves. All of this would be fine if not for the fact that Tamarisk is the veritable thirsty slob of shrubbery. Single trees use almost 300 gallons of water per day and when the salty leaves fall off and decompose, they increase the salinity of the soil. (See Figure 2). This makes it difficult for surrounding plants to survive. Therefore, Tamarisk grows in very large exclusive clusters. Plus, in the extremely arid



Figure 2: Talk about thirsty plants! These Tamarisk trees are slowly draining this pond. And if their boundless thirst isn't enough, the Tamarisk also forces out other native plant species by increasing the salt content of the soil.

climates of the desert southwest, a thirsty guzzler such as Tamarisk only makes the dry desert more inhospitable to life. Water becomes scarce not only for other plants but also for animals trying to survive. In addition, the density of Tamarisk growth assists the spread of destructive brush and forest fires. For these reasons, states dealing with Tamarisk infestations are eager to control the growth of the persistent shrub.

The first step toward

control is to know where the trees are growing. After all, you don't want to do a blitzkrieg-style treatment that might kill off the very native species you're trying to save. Surveying trees manually from the ground, however, is extremely time consuming and not practical or particularly accurate. Even aerial surveillance provides only a sketchy picture of the location of the trees. Therefore, a county in Kansas dealing with Tamarisk invasion is using satellite images to map out the vegetation. Initially, this may seem even less useful than aerial surveys since they are taken from even further above the ground. This is probably true if all the surveyors got from the satellite was a traditional black and white image. However, that is not all they receive from the satellite. The satellite, called QuickBird, takes extremely high resolution black and white pictures of the Earth's surface but it also takes

...Thinking Software

LPA's integrated suite of advanced software tools enables you to build intelligent applications both rapidly and safely.

LPA products feature:

- Robust and reliable run-time performance
- Support for DLLs, DDE, OLE, ODBC, TCP/IP, HTML standards
- Graphical tools and debugging aids
- Choice of delivery environment (VB, Java, Web, Delphi)

Modules include:

- LPA Prolog for Windows** - leading Prolog compiler system
- Flex** - popular hybrid expert system toolkit
- Agent** - distributed agent toolkit
- Flint** - fuzzy and probabilistic reasoning
- VisiRule** - graphical expert systems generator

Logic Programming Associates Ltd

www.lpa.co.uk info@lpa.co.uk
 Phone: + 44 (0)20 8871 2016
 Fax: + 44 (0)20 8874 0449

Order the new Volume 17 CD at www.pcai.com/store

multi-spectral images at a slightly lower resolution. The black and white images can resolve on objects within a 2 foot radius. The multi-spectral images provide information on the red, green, blue and near-infrared portions of the spectrum while focusing on objects within an 8 foot radius. Combining the two images is crucial to identifying different tree species. Different trees have slightly different infrared and color profiles but the low contrast of the multi-spectral information probably would not expose the differences to human eyes. However, combining that data with the high resolution black and white images and inputting the information into a computer allows the user to extrapolate the useful information from both images. To this end, Kearny County in Kansas sought the help of the Native Communities Development Corporation (NCDC). They took the satellite images and converted the pixels to data points correlated by geographic location. Then they could superimpose the black and white and multi-spectral information. They entered the information into a program called Feature Analyst by Visual Learning Systems. That program used machine learning to identify vegetation. The NCDC researchers gathered data from the field which they used to train the program. For instance, researchers test infrared radiation from a confirmed Tamarisk tree and identify its exact wavelength. Then they tell the computer that whenever it encounters that wavelength in the data points then that pixel most likely represents a part of a Tamarisk. Using these techniques, Kearny County was able identify concentrations of the tree¹. The county can now treat those areas and repopulate them

with native vegetation. In practice, this is easier said than done since the Tamarisk has effectively changed the ecosystem and drained the soil of essential water and nutrients, but the AI technologies used to identify the trees provide the first step in eliminating the invaders.

Growing Healthier Crops

It is easy to take the fresh produce in markets for granted. When we walk into the market, we expect to see potatoes, carrots, onions, apples and an ever increasing selection of other fruits and vegetables. Our task is as easy as bagging the veggies and taking them to the cash register. But, for the farmers that grow this produce, their job is not nearly as simple. Crops are very sensitive to the environment around them. For instance, the tomato crop was severely hindered in late 2004 by all of the storms in Florida and the Southeast US. Signs on doors of restaurants indicated that fresh tomatoes would no longer be available in salads or on top of burgers. The tomatoes that were available were exorbitantly priced. As with tomatoes, weather plays a

large role in the overall health, quality, and quantity of other crops.

Of course, farmers can't control the weather. However, weather is not the only factor in crop success. A particular problem for crops is the invasion of pests. Whether they are animal or insect creatures, they see fields of plants as a veritable salad bar. What makes pests different than weather is that pests can be controlled using a variety of chemical and non-chemical methods. But, the benefits of these control methods must be balanced with their possible downsides. Chemical pesticides in unreasonable levels can be detrimental to crops and dangerous to the consumer. Other methods of control including

**Inference without
THE ENGINE**

EZ-Xpert 3.0

Features:

- **Warp Speed - Test over 20,000 rules per second**
- **Fast Development - Easy to learn, create hundreds of rules a day**
- **No need to write code**
- **23 Verification Criteria insure accuracy**

Get the EZ solution today!

AI Developers, Inc.
Phone: (888) 327-9397
info@ez-xpert.com
www.ez-xpert.com

introducing other species into the area to feed on the pests may harm other beneficial species in the area. Therefore, it is important to tailor the treatment to the specific kind of infestation and not to treat if the pests pose no threat.

In the interest of providing farmers with a better idea of how to treat pest infestations, researchers developed a decision-support system called the Case-Based Range Management Advisor (CARMA). This system is specifically designed to provide advice about grasshopper infestations. It is tailored to rangeland infestations; however, recently researchers at the University of Nebraska, the University of Wyoming, and LiveWire Logic, Inc. proposed expanding the scope of CARMA to include cropland decision support². Since different types of grasshoppers pose different threats to rangeland and cropland, this is a useful idea. However, rangelands

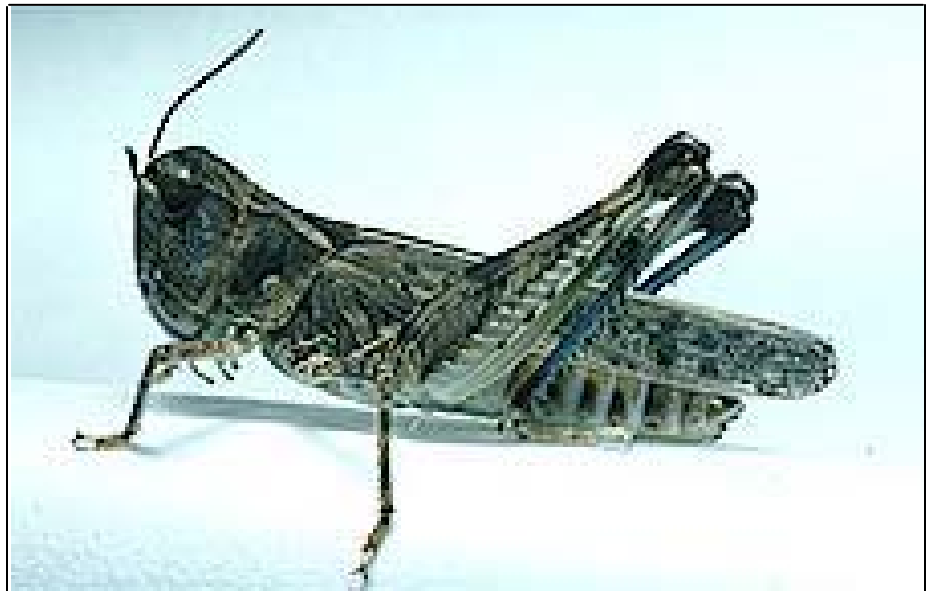


Figure 3: Different species of grasshoppers eat different types of plants. This *A. ellioti* feeds only on grasses.

are often adjacent to cropland so the insect problem can migrate from one area to another. Therefore, a complete overhaul of the CARMA system is not necessary but additional recommendations specific to croplands. By looking at the

expert advising process, the researchers were able to determine the types of questions the system must ask. First, the experts must find out the specifics of the grasshoppers, the crops, and the area in which the infestation began. Then they must determine

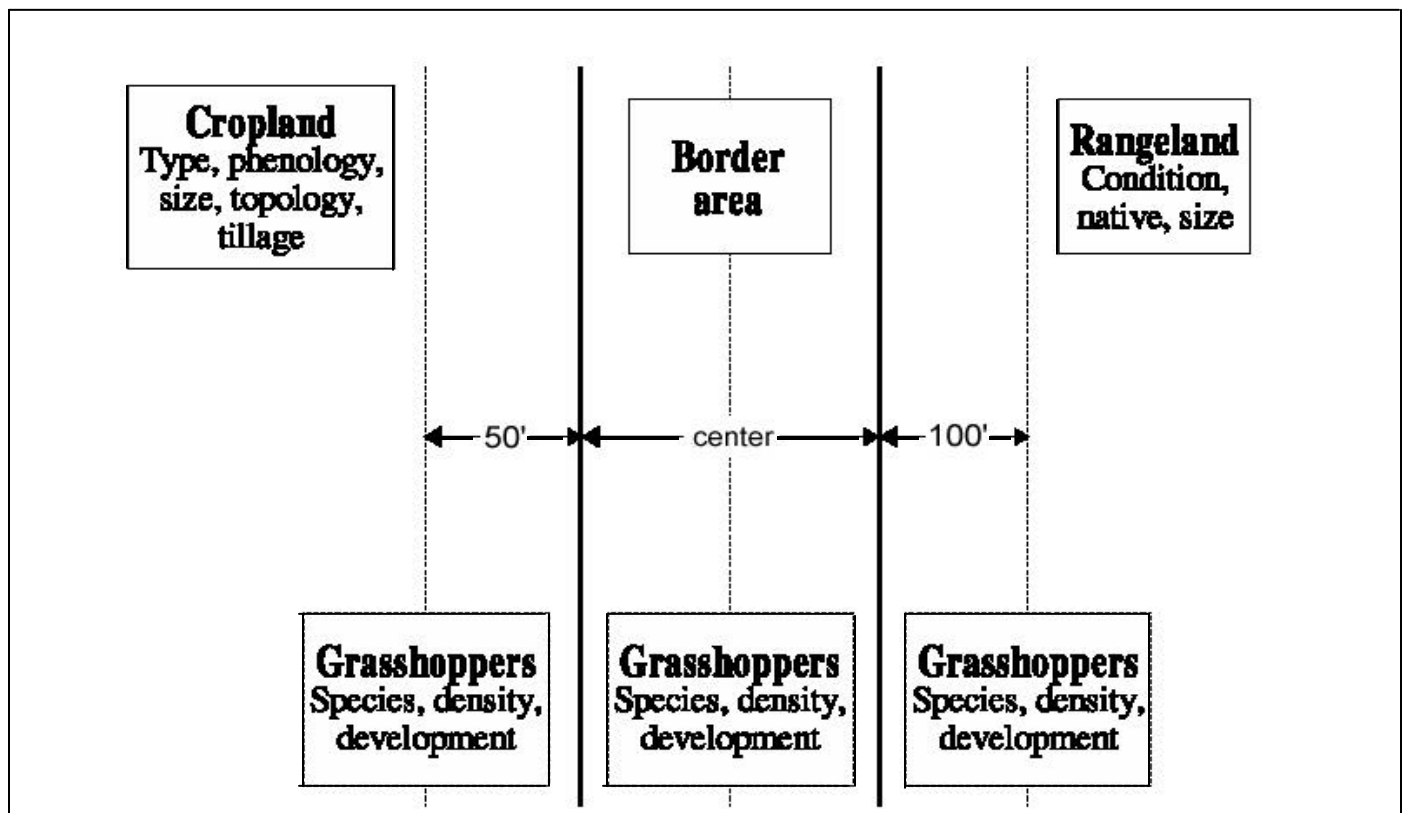


Figure 4: By determining the species of grasshopper, the type of crops, and the location of the infestations, farmers can treat the problems more efficiently.

whether the grasshoppers pose a threat to the crops. Finally, they need to recommend a response that minimizes the damages while keeping cost to a minimum.

So, let's discuss these concerns in further detail. In the first step, pinpointing the grasshopper and crop species is important because only certain types of grasshoppers feed on certain crops (See Figure 3). For instance, types of grasshoppers that feed only on grasses would be unlikely to pose a threat to corn. Therefore, it would be inadvisable for a farmer to treat his cornfield if the grasshoppers in question were not even interested in the corn. Determining the point of origin is another concern in effective treatment of infestations. As an analogy, think about the treatment of ant infestations. Killing individual ants as you see them is not an effective means of controlling the ant population. However, finding the hive where they originated and treating that instead will destroy the ant colony with a minimum of cost and effort. The same is true for grasshoppers - treating the area where the problem begins is more likely to result in longer-lasting pest control. Specifically, the modified CARMA system would test areas within the rangeland, areas within the cropland, and areas in the border region (See Figure 4). If there are many grasshoppers in the cropland, fewer in the border region and none in the rangeland, then the farmer might surmise that the infestation started in the border region and migrated to the cropland. Therefore, the farmer would treat the border region in addition to the affected regions within the cropland. Similar populations of grasshoppers in each region that extend further into the rangeland might indicate that the infestation began in the

rangeland, particularly if the nearby crops are of a grass type. In this case, all affected regions should be treated, paying particular long-term attention to the rangeland populations only. The final case of origination in the cropland is extremely rare, since farmers take special tilling measures to discourage pests from breeding there. In this rare case, the recommendation would be to treat only the cropland. Tailoring the plan of attack in this manner leads to reduced cost of treatment and a reduction in dangerous pesticide use. In addition, it could prevent species from becoming resistant to treatment measures. Over time, organisms can become impervious to efforts to kill them. This is never more acutely evidenced than in the growing resistance of bacteria to antibiotics. In the past, doctors simply gave patients cocktails of antibiotics or over-prescribed certain antibiotics when they were not necessarily needed. These slipshod procedures allowed bacteria to gain resistance in a much shorter time frame than expected. Just as it is important for doctors to do sensitivity testing to limit the amount of antibiotics prescribed, it is important for farmers to become more selective in pest treatment so as not to encourage the development of resistant species.

Conclusion

If there's one thing that AI excels at, it is revealing hidden, useful details within abstract collections of numbers. While the human brain only has limited computing power, AI harnesses an amazing ability to crunch numbers into intriguing data. This makes AI an ideal method of studying the environment around us. While everyday human perception may miss small details and correlations, AI can bring possible

environmental issues to light, saving time and money in the long run. With more and more mechanized solutions to everyday tasks, it is important not to forget to appreciate the outdoor world. After all, many of the artificial intelligence advances were modeled upon the ingenious ways that nature strikes up a delicate balance. For instance, genetic algorithms were based upon the evolutionary models of living populations - upon the ways that organisms changed over time to adapt to their environments. Neural networks were based on the complex workings of the brain. Fuzzy logic algorithms strive to take into account the gray areas between "yes" and "no" - a parallel to the adaptive thinking of living organisms. So, AI owes a lot of its inspiration to the natural world - therefore it seems only fitting that it should find a calling in environmental preservation efforts.



Ilana Marks is an editor/writer for PC AI Magazine. She received her Bachelor of Science degree in Molecular and Cellular Biology from the University of Arizona in Tucson, AZ. She can be reached at ilana@pcai.com

References:

1. "Taming the Tamarisk" - www.govtech.net/magazine/story.php?id=93807
2. John Hastings, Karl Branting, Jeffrey Lockwood, and Scott Schell, "CARMA+: A General Architecture for Pest Management," *Proceedings of the Workshop on Environmental Decision Support Systems*, Eighteenth International Joint Conference on Artificial Intelligence (IJCAI-2003), Acapulco, Mexico, August 9-15, 2003

The State of AI Today: Rediscovering Hidden Technologies

By Elizabeth Lane

Introduction

AI in the 21st century seems to be especially geared toward application. Researchers are very interested in how people in the real-world could apply their technologies. AI used to be the domain of the highly technical person, and thusly was highly intimidating to the average person. While the AI research and researchers are still highly technical, they seem to be making advances that are less inherently scary to the layman because the technical bits are cloaked in normal, everyday language and user-interfaces have been retooled to be accessible to the average user. For instance, take expert systems. Behind the interface, there is sophisticated technology that processes a variety of inputs to discover the most beneficial course of action. However, on the user's end, what they are likely to see is a familiar Windows-type dialog box where they can enter answers to straightforward questions and perhaps save themselves time and

money by quickly receiving advice.

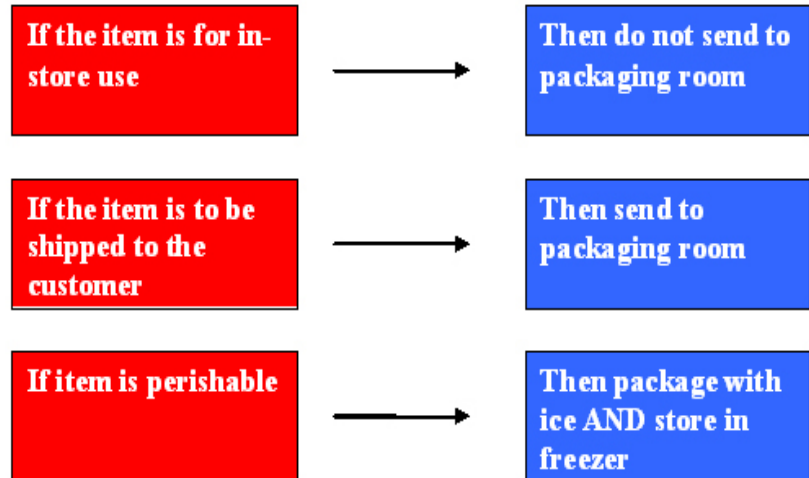
The fact that people don't realize when they come into contact with AI is a testament to the efforts of researchers and software designers. If you were to mention artificial intelligence to the average person on the street they would likely talk about images culled from a dozen different science fiction movies. However, then they'll go home and use an AI-powered search engine to find information on that one movie whose name they can't remember! Technology has come so far that it is almost hard to believe that there was once a time when business was conducted solely face-to-face, or in the case of long distance business, over the phone or through the mail. Today, you can order merchandise from a seller in Japan based on recommendations from past purchases all while never even hearing another human voice. And best of all, you don't even need to break out the latest currency conversion rates because a software program has already done all the

leg work for you. Because these technologies are so very useful, we have quickly learned to take them for granted. Therefore, it seems like a good time to reflect on the state of AI in today's world, so as to remind everyone that AI is alive and going strong, but it has taken a cue from the streamlined world of the 21st century and is blending in with its surroundings.

Business Rules

In order to be successful, businesses have a lot to worry about. As someone who does not own a business, for all I know there are magical elves orchestrating the successful transactions - in other words, people like me often don't care about what leads up to a good business-customer interaction as long as we're satisfied with the results. However, the truth is that a variety of different factors must combine to create a business which can meet and anticipate the needs of its customers. This is particularly true for large

businesses. The little deli around the corner with faithful, regular customers can easily respond to what their customers want. They don't need to do extensive market research to discover that their chopped liver is very popular. However, the large corporation with oodles of customer data has a more difficult time reacting to what customers want. And, if that's not enough, they also need to deal with internal matters such as accounting and human resources. As an example, let's say that our little deli decided to open up shop on the Web with sales to the entire world. First, they would need to design a Website that consumers could easily use to place their orders. They might need to change their menu selections based on what items they are able to ship. To please customers in other parts of the globe, they may need to add additional items or come up with different versions of



Business rules serve to explicitly define business processes. These might be business rules for our imaginary deli. Such rules tell the machinery what actions are appropriate given certain circumstances.

existing recipes. They would also need to form a relationship with a shipping company so as to get the best rates for sending their

products and to obtain proper packaging equipment. They would also need to be equipped to handle and respond to customer


Get the right answers to the right people at the right time.


**Don't just dish out data...
Make your web site "smart"
with expertise access!**

EXSYS knowledge automation software and consulting services capture the decision-making processes of experts in interactive online systems, which deliver individualized answers to prospects, customers and employees whenever and wherever needed.


Accessible 24/7, Exsys CORVID® interactive systems replicate "consultations" with your top-level experts. They can shorten sales cycles, assure compliance, improve customer and product support, handle routine tasks, analyze data streams, simplify reporting, and tackle many business "points of pain".

Contact an EXSYS rep today to find out how.





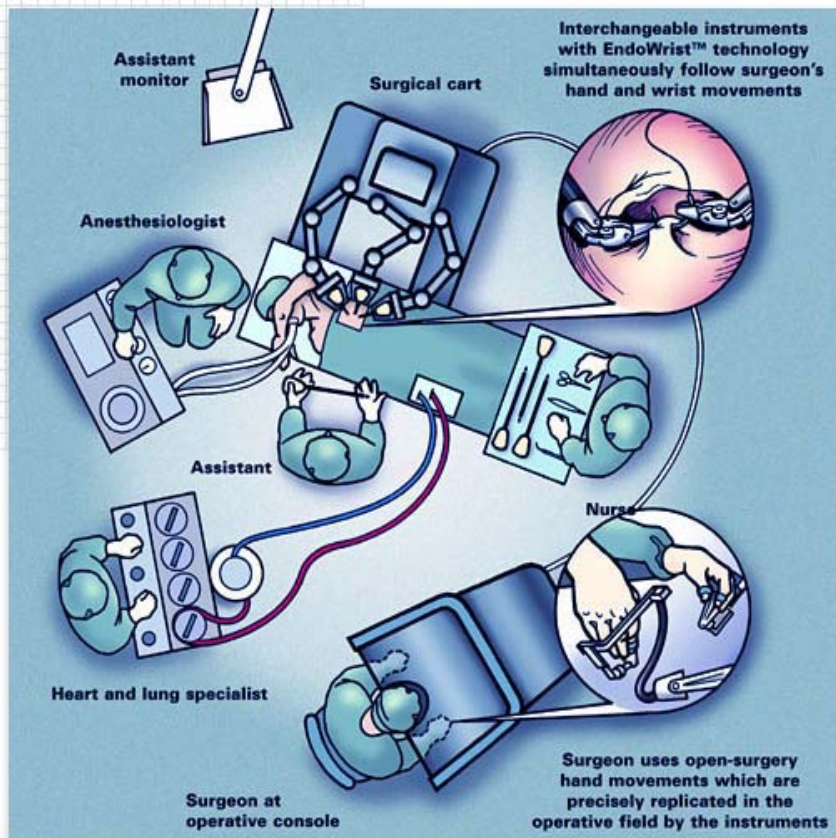
New ver. 3.2
 Go to Exsys Site for
 Demos and Case Studies
 Download FREE
 30-Day Evaluation with Tutorial



www.exsys.com
 +1.505.888.9494

complaints and suggestions, regardless of what part of the world they live in. That's a lot of work involved in accomplishing a fairly easy task - providing bagels, cream cheese, and lox to hungry customers. That's where business rules come into play. Business rules allow corporations to achieve their goals as painlessly as possible.

Business rules are statements that explicitly define business processes or techniques. These rules are integrated into various software programs which help to automate these processes. For example, a business rule for our hypothetical global deli may be "If the foreign customer orders 1 pound of lox then the item must be packaged in a large global overnight shipping box with ice." This rule tells the automated packaging equipment what to do when it encounters such an order and it becomes unnecessary for a human employee to enter instructions for each individual case. Because efficiency is paramount to many businesses, business rules technologies have enjoyed a surge in popularity over the last few years. Like it or not, humans are limited in the speed at which we can perform tasks and we don't have the processing power to keep on top of millions of different tasks. Therefore, it is inevitable that this surge in business rules popularity will continue to result in human downsizing. However, one can look at this either as a bad thing or a good thing. Since I am the perpetual optimist, I tend to look on the bright side. Technology is not 100% infallible. Humans still need to be there to troubleshoot problems and to maintain the integrity of the rules over times of change. Therefore, I believe business rules technology will open up new, more technical human jobs, forcing potential



One of the current applications of AI is in the da Vinci Surgical System. In this system, a real-life surgeon remotely controls a robotic surgeon. This is a schematic of how it currently works. In the future, researchers hope to completely remove the human element and use the system in situations where human surgeons are inconvenient.

Image Source: www.cts.usc.edu/lrsi-davincisystem.html

employees to become better educated which can only be a benefit.

Medical Technologies

There are certain arenas that I always believed that AI would never be able to infiltrate. The practice of medicine was one of those. I always envisioned medicine as something that required not only textbook knowledge but the ability to use that knowledge to think outside the box. I thought that this sort of adaptive thinking would be a long time coming for AI technologies. However, recent developments are beginning to prove me wrong. I suppose it shouldn't be too much

of a surprise - as neural network technology continues to advance, the prospect of a computer with the ability to comprehend and react in the same way a human does really isn't too far off. Just like in the human brain, neural networks strengthen neural connections that are used often while phasing out connections that are obsolete. This is what leads to adaptive learning and the ability to tailor responses based on the current situation rather than relying on a set algorithm.

Take for instance the da Vinci Surgical System discussed in the

Order the new Volume 17 CD at www.pcai.com/store

18.5 issue of PC AI. My response to such a prospect just five years ago would probably have involved a lot of laughter. However, it seems less far-fetched today. The hairpin precision of computer controlled mechanical equipment coupled with adaptive AI technologies begins to sound like a powerful tool, particularly in cases where real-life surgeons may have a difficult time accessing the patient. Currently, the da Vinci system is still in its infancy - basically a remote-controlled unit powered by a real surgeon sitting a few feet away watching the progress on a monitor. However, as we all know too well, before we turn around, the da Vinci system will be performing surgeries all by itself. While this is perhaps still a little scary, one must realize that

robotic surgical systems condense all of the knowledge of a variety of different surgeons. Therefore, the surgery is not performed by some guy who just walked in off the street. It is performed by a well-trained and accurate computer program. Bring to that the power of advanced decision-making and neural network software and it is likely that the da Vinci system will be indistinguishable from real-life surgeons (well, other than the fact that mother wouldn't want you to marry the da Vinci system!)

Military Applications

The war on terrorism has led many researchers to look for ways that their technology can be applied to military concerns. Terrorists are a ruthless inhuman lot who resort to cowardly

measures in their attempts to wipe out everyone who is different from them. They do not abide by any war rulebooks or treaties. Therefore, it is vital to be smarter and more cunning than them. It is also desirable to protect the soldiers fighting this war. Therefore, military AI technologies concentrate on removing the human element from traditional military equipment. The Defense Advanced Research Projects Agency, or DARPA, takes great interest in funding such research. One current research project involves the development of unmanned military aircraft. Removing the human from the aircraft allows it to perform more complex maneuvers that would take their toll on the human body. It also prevents injury and death to



How Will You Approach Data Mining?

Data Mining: Levels I, II & III

Strategy - Methods - Practice

Vendor-neutral public courses
in Washington DC, Orlando
Las Vegas and San Diego

PC AI Subscribers: Register Early
and Save \$200! Full Course Details:

www.the-modeling-agency.com/pcai-special
(888) 742-2454

pilots in the event that the plane is shot down (or otherwise disabled.) Such aircraft used in battle would require a smorgasbord of AI technologies, rather than a single technology. They would require neural networks to adapt to different flying conditions. They would need visual recognition systems to determine what sort of evasive action should be taken and when to fire missiles. Perhaps they would use genetic algorithms to optimize fighting strategies. Overall, creating useful unmanned aircraft is a difficult task but with the power of AI, it is far from impossible.

Another DARPA project involves unmanned vehicles on the ground. The DARPA Grand Challenge provides a forum for top AI researchers to present unmanned vehicles capable of intelligently traversing harsh landscapes, not dissimilar to the conditions in Afghanistan, Iraq



In the DARPA Grand Challenge, unmanned autonomous vehicles strive to cross the harsh desert terrain which abiding by certain rules of the road and circumnavigating obstacles.

Image Source:
www.darpa.mil/grandchallenge04/Web_Photos/Sat/index.htm

and other battle grounds in the War on Terror. The Grand Challenge disguises this important

research opportunity as a race. Teams develop autonomous vehicles and then race them across the desert of the Southwest United States. Each team is hoping that they will be the team to cross the finish line in the shortest amount of time. And this is no 100 meter dash - the race is about 200 miles from start to finish. So far, no team has finished the course, but qualified participants have another chance on October 8, 2005. I certainly have my fingers crossed for the teams this year. You can read more about the DARPA Grand Challenge 2005 in the Robotics column of this issue.



Images like this are visible because of the NASA Mars Rovers. Here, the sun is setting on Mars. Future versions of the rovers will include more AI technologies in order to capture more stunning views and learn more about the mysterious planet.
Image Source: <http://marsrovers.nasa.gov/gallery/press/spirit/20050610a.html>

Robots, Robots, and More Robots

Robots are becoming more popular than ever. Perhaps it's because the age of affordable household robots is quickly approaching. Robotic vacuum cleaners are sold to average consumers who no longer want to push around a heavy vacuum (or just want to show off their new toy



Unmanned aircraft are designed to keep soldiers safe without sacrificing military objectives. The X-47A Pegasus model is one such aircraft in development.

Image Source: www.darpa.millj-ucas/

to their friends.) Robotic lawnmowers are taking away that oh so pleasurable Saturday morning task. Robotic toy dogs delight children around the world. Of course, as such technologies are marketed at the average consumer, they must be very user-friendly. After all, if the instruction manual says that required equipment is a Philips screwdriver and a computer scientist then a large segment of potential users is cut out (I don't know about you, but I don't keep a computer scientist in my tool chest.) In order to court the widest range of consumers, the controls must be clear and easy to use, the unit should not interfere with everyday activities, and it must be truly intelligent. After all, if you spend most of the vacuuming time chasing after the cleaner to make sure it doesn't take a death-defying tumble down the stairs then you are probably better purchasing a good old upright, human-powered model. Therefore, companies that market

robotics for at-home use take great care to make sure that anyone can use it.

Robotics technology is not just for the home, however. It has a virtually limitless range of applications. The military applications above are a good example. However, probably the most famous application of robotics technology outside the home is in the NASA Mars rovers. Those robotics explorers provided us with an entirely new glimpse of our planetary neighbor. From the rover explorations we discovered that Mars may have had ancient water on it. And the rover technology does not end with Spirit and Opportunity. NASA researchers continue to work on new rovers that can explore more treacherous terrain and perform additional tests. And the population here on Earth is likely to follow the progress of future rovers with the same voracity with which we watched Spirit and Opportunity. It's exciting to be

able to see sights that we have never seen before - who didn't run around the house with a bowl on their head pretending to be an interplanetary explorer when they were younger? In that enthusiasm for the Mars Rover projects, it is easy to overlook the fact that AI is in fact behind them, and will increasingly be employed in future models.

Conclusion

On the surface, it may seem that AI has lost that surge of popularity that it enjoyed in the 1980s. However, this is only an illusion. Sure, AI technologies were much more "gaudy" in the 1980s (what wasn't?) In today's world, the AI is often hidden in tiny packages inside computers and integrates so seamlessly with everyday tasks that it is virtually imperceptible. The rate at which technology is advancing requires intelligent techniques to keep everything under control and useable. I think of today's AI as more of a bridge between everyday people and the more technical areas of the computerized world. This makes technology accessible to everyone, regardless of their field of expertise.



This article is the first in a series of articles covering the state of AI in the 21st Century. Stay tuned to PC AI for future editions.

Visit the PC AI Store at www.pcai.com/store to order PC AI CDs, subscriptions, and back issues

ROBOTICS

The Grand Challenge is Coming!

By Rob Costi

Introduction

For researchers in the robotics arena, the Defense Advanced Research Projects Agency (DARPA) Grand Challenge is an exciting opportunity. It is a chance to prove that their creations can survive and adapt to changing conditions. In other words, it is a chance for them to prove that their creations have intelligence. The DARPA Grand Challenge takes autonomous vehicles on a long trek through harsh desert terrain littered with obstacles in the hopes of furthering research into technologies that will keep soldiers safe on the battlefield. Although the 2004 event (covered extensively in PC AI Volume 17) proved to be a formidable challenge, this year's crop of competitors hopes to learn from past mistakes to emerge victorious.

About DARPA

DARPA (www.darpa.mil) is the research and development branch of the Department of Defense. DARPA's goal is to

promote research that will revolutionize the way that military battles are fought and managed. DARPA was initially formed in 1957 in response to the emerging space age. At that time, people were fearful of the advancing technologies which were delivering vehicles into space. In other words, if our enemies had these kinds of technologies, then what else might they have? So, DARPA's initial projects were primarily related to outer space in the hopes of anticipating threats from other countries with well-developed space programs. Over time, these research activities were transferred to the National Aeronautics and Space Administration (NASA) and DARPA began to focus on genuine military threats such as intercontinental ballistic missiles. These activities were directed towards creating a successful defense against such weapons. Beginning in the 1970s, DARPA started to research technologies to create successful offensive strikes. Particularly, this research led to

stealth aircraft and submarines. Most famously, DARPA created the precursor to today's Internet, called the ARPANet. Of course, just a few short decades later, we have developed almost a complete reliance on this technology. This goes to show that technologies developed for military purposes can be further developed to become useful civilian technologies. The DARPA Grand Challenge, which debuted in 2004, is an event which seeks to bring together top robotics researchers from around the United States to develop autonomous ground vehicles that can traverse rough terrain intelligently. These technologies could one day be applied to a variety of vehicles used in military operations in order to keep human soldiers safe or to take enemies by surprise.

Grand Challenge 2004 Recap

DARPA's Grand Challenge is basically an off-road race where

autonomous vehicles of different sizes and shapes compete to be the vehicle that traverses the long course in the shortest amount of time. Months and years of work go into developing these vehicles and the development teams must survive a series of rigorous qualifying rounds in order to be part of the elite few that even reach the final race. What makes the race so revolutionary is that these are unmanned vehicles that with no remote human control. These vehicles navigate using artificial intelligence technologies. Participating teams are given an electronic file containing route details which they can program into the vehicles; however these files do not take into account the natural and man-made obstacles along the route. These route details provide information on latitude and longitude coordinates along the route as well as the width of the course at different areas and maximum speed limits. Of course, this data does not tell the vehicle if there is a big boulder in the middle of the track. Therefore, the vehicles must integrate technologies that sense such obstacles and transmit the information to the "brains" of the robot for proper corrective action. The vehicles must adhere to the speed limit and course boundaries or they risk disqualification.

The first Grand Challenge was held on March 13, 2004. The designated route traversed the rough desert terrain from Barstow, California to Primm, Nevada.



Sandy terrain from the 2004 DARPA Grand Challenge. It looks like a nightmare to traverse, even in a manned vehicle. Image Credit: DARPA

4 out of 5 of Fortune Magazine's most profitable companies purchased dtSearch developer or multi-user licenses in the past two years.

dtSearch® Instantly Search Gigabytes of Text Across a PC, Network, Intranet or Internet Site

dtSearch
Instantly Search Gigabytes of Text
DESKTOP with Spider
\$199
"Industrial-strength... superb"—PC Magazine

dtSearch
Instantly Search Gigabytes of Text
Text Retrieval ENGINE for Win & .NET for Linux
"Industrial-strength... superb"—PC Magazine

dtSearch
Instantly Search Gigabytes of Text
WEB with Spider
from \$990
"Industrial-strength... superb"—PC Magazine

dtSearch
Instantly Search Gigabytes of Text
PUBLISH for CD/DVDs
from \$2,500
"Industrial-strength... superb"—PC Magazine

dtSearch
Instantly Search Gigabytes of Text
NETWORK with Spider
from \$800
"Industrial-strength... superb"—PC Magazine

Publish Large Document Collections to the Web or to CD/DVD

- ◆ over two dozen indexed, unindexed, fielded & full-text search options
- ◆ highlights hits in HTML, XML & PDF while displaying embedded links, formatting & images
- ◆ converts other file types (word processor, database, spreadsheet, email, ZIP, Unicode, etc.) to HTML for display with highlighted hits

dtSearch Reviews...

- ◆ "The most powerful document search tool on the market" — *Wired Magazine*
- ◆ "Intuitive and austere ... a superb search tool" — *PC World*
- ◆ "Blindingly fast" — *Computer Forensics: Incident Response Essentials*
- ◆ "A powerful arsenal of search tools" — *The New York Times*
- ◆ "Covers all data sources ... powerful Web-based engines" — *eWEEK*
- ◆ "Searches at blazing speeds" — *Computer Reseller News Test Center*

1-800-IT-FINDS
sales@dtsearch.com

See www.dtsearch.com for:
◆ hundreds of developer case studies & reviews
◆ fully-functional evaluations

The Smart Choice for
Text Retrieval® since 1991

The course stretched about 200 miles. Anyone who has ever taken a road trip in the desert southwest knows how swiftly the terrain can change (of course, on those road trips, the automobile is typically, at the very least, on paved roads.) So, you can imagine the challenge of off-road travel in those areas, particularly if there is no human driver in the vehicle. Fifteen teams had passed the qualifying rounds to reach the Grand Challenge. A one million dollar prize funded by the US congress was to be given to the vehicle that finished the course in the shortest amount of time (and under 10 hours). However, fate had decided to be unkind to the competitors. An unfortunate power surge damaged the electrical equipment of many of the vehicles which made them ill-equipped to respond to obstacles. Several vehicles couldn't even get out of the starting chute because their "minds" were so boggled. The vehicles that did get past the starting line were quickly stopped by obstacles. The vehicle that made it the farthest only made it 7.4 miles before it ran off the course. While no team completed



Autonomous vehicle #22 - Sandstorm by The Red Team. In the 2004 Grand Challenge, this vehicle traveled the longest distance before being disqualified - 7.4 miles.

Image Source: www.darpa.mil/grandchallenge04/Web_Photos/sat/pages/DARPAGCSa_04.htm

the course and the prize was not awarded, there were really no losers. The challenge was a testament to human ingenuity. The fact that a vehicle even made it over 7 miles is impressive since the terrain was so rough and littered with obstacles. As is the case with most dedicated people,

the teams did not dwell on the failure, but rather tried to learn from their mistakes. You can read more about the 2004 DARPA Grand Challenge in PC AI Issues 17.3, 17.4, and 17.6.

The Upcoming 2005 DARPA Grand Challenge

Since innovative research never ends, the DARPA Grand Challenge was not just a one-time event. DARPA plans to hold Grand Challenges every year until someone wins (or until funding runs out). As no one won the 2004 Grand Challenge, the 2005 Grand Challenge will be held later this year. It will be similar to the 2004 Grand Challenge in that the race will take place in the desert Southwest. The actual route has yet to be disclosed. Teams began applying to the 2005 Challenge in late 2004. One hundred and eighteen teams presented their vehicles to DARPA officials and on June 6, 2005, DARPA announced the 40 semi-finalists who advanced to the second round. You can view



The 2004 DARPA Grand Challenge Course also challenged teams to cross water. Image Credit: DARPA

A.I. Motorvators
 Autonomous Vehicle
 Systems
 Autonosys
 Axion Racing
 BJB Engineering
 Blue Team
 CIMAR
 CyberRider
 Desert Buckeyes
 The Golem Group/UCLA
 Gray Team
 Indiana Robotic
 Navigation
 Indy Robot Racing Team
 Insight Racing

Intelligent Vehicle Safety
 Technologies I
 The MITRE Meteorites
 Mojavaton
 MonsterMoto
 Oregon WAVE
 Palos Verdes High School
 Road Warriors
 Red Team
 Red Team Too
 SciAutonics/Auburn
 Engineering
 Stanford Racing Team
 Team AION
 Team Banzai

Team CajunBot
 Team Caltech
 Team Cornell
 Team DAD
 Team ENSCO
 Team Jefferson
 Team Juggernaut
 Team Overbot
 Team TerraMax
 Team Tormenta
 Team UCF
 Terra Engineering
 Virginia Tech Grand
 Challenge Team
 Virginia Tech Team
 Rocky

The teams that made it to the semi-finals of the DARPA Grand Challenge 2005. They will be participating in the National Qualifying event in Fontana, California on September 27, 2005. Some of these teams were finalists in the 2004 DARPA Grand Challenge.

the announcement at www.darpa.mil/grandchallenge/NQ_E_Press_Release.pdf). These 40 semi-finalists will participate in the National Qualification Event (NQE) September 27 to October 5, 2005 which will be held at the California Speedway in Fontana, California. Only 20 of those teams will be selected to compete in the 2005 DARPA Grand Challenge. Some of the teams who will be participating in the NQE were competitors in the 2004 Grand Challenge. Others are new teams hoping for a chance to show off their creations. The rules for the 2005 competition are similar to the 2004 event. The vehicles must be entirely autonomous and must adhere to the course route as specified by the Route Data Definition File that will be provided to qualifying teams before the Grand Challenge. On the course, vehicles will be followed by manned control vehicles containing race officials. All unmanned vehicles are equipped with a remote controlled stopping and starting system. That way, race officials can disable any

vehicles that are operating in an unsafe manner or that have been disqualified from the race. They can also pause and restart vehicles in order to allow other vehicles to pass. The race is expected to be carried out within one day; however provisions are made in case of extenuating circumstances for the race to be suspended and

continued the next day. The individual elapsed times of all participants are monitored subtracting off any time delays resulting from pauses activated by the officials. Provided that teams cross the finish line, the team with the shortest elapsed time will win the 2 million dollar prize (up 1 million from last year) . . . and



To misquote The Beatles - The long and winding road that leads to the finish line. The Grand Challenge 2005 will likely have many stretches of terrain like this. The route definition files received by participants would map out this path, however they would not mention the embankments at the side of the road or the rocky character of the path.

bragging rights, of course! The 2005 Grand Challenge will be held October 8, 2005 barring any unforeseen delays. For those curious about the rules and restrictions by which the teams must abide, you can check out the official rules (www.darpa.mil/grandchallenge/Rules_8oct04.pdf). From the looks of this 31-page booklet, the participants have to worry about much more than just getting their robots up and running! For instance, they must make sure that their vehicles do not cause damage to the route. Therefore, teams must take into account issues of clearance (both head clearance and ground clearance) as well as width. However, the rules are fair since these vehicles may be prototypes for future real-world applications. The most important thing in a real-world application is safety,

particularly when the application is an unmanned vehicle. You don't want innocent bystanders to be injured by an autonomous vehicle that is out of control and destructive.

Conclusion

The DARPA Grand Challenge is like the Indianapolis 500 for robotics fans. However, most spectators are not rooting for a particular team to win - rather that a team does win. It would be a huge advance in robotics technology for an unmanned, artificial intelligence controlled vehicle to traverse 100+ miles of brutal terrain while following a very specific set of course rules. The fact that the autonomous vehicle technology present at DARPA Grand Challenge events may serve as inspiration for military advancements is exciting.

These technologies will one day help protect our soldiers without sacrificing military objectives. Also, someday down the line, autonomous vehicles will probably begin showing up in our own driveways (then you literally can be a backseat "driver!").

Stay tuned to PC AI or check out the DARPA Grand Challenge website (www.darpa.mil/grandchallenge/) for further details of the 2005 Challenge as they become available. Also, if you live in California or can travel to California there will be spectator areas at the National Qualifying Event as well as at the actual Grand Challenge if you're interested in checking out the competition firsthand.



Final Data from DARPA Grand Challenge

Sorted by distance Traveled.

(As of 5:00 p.m. PST, March 13, 2004)

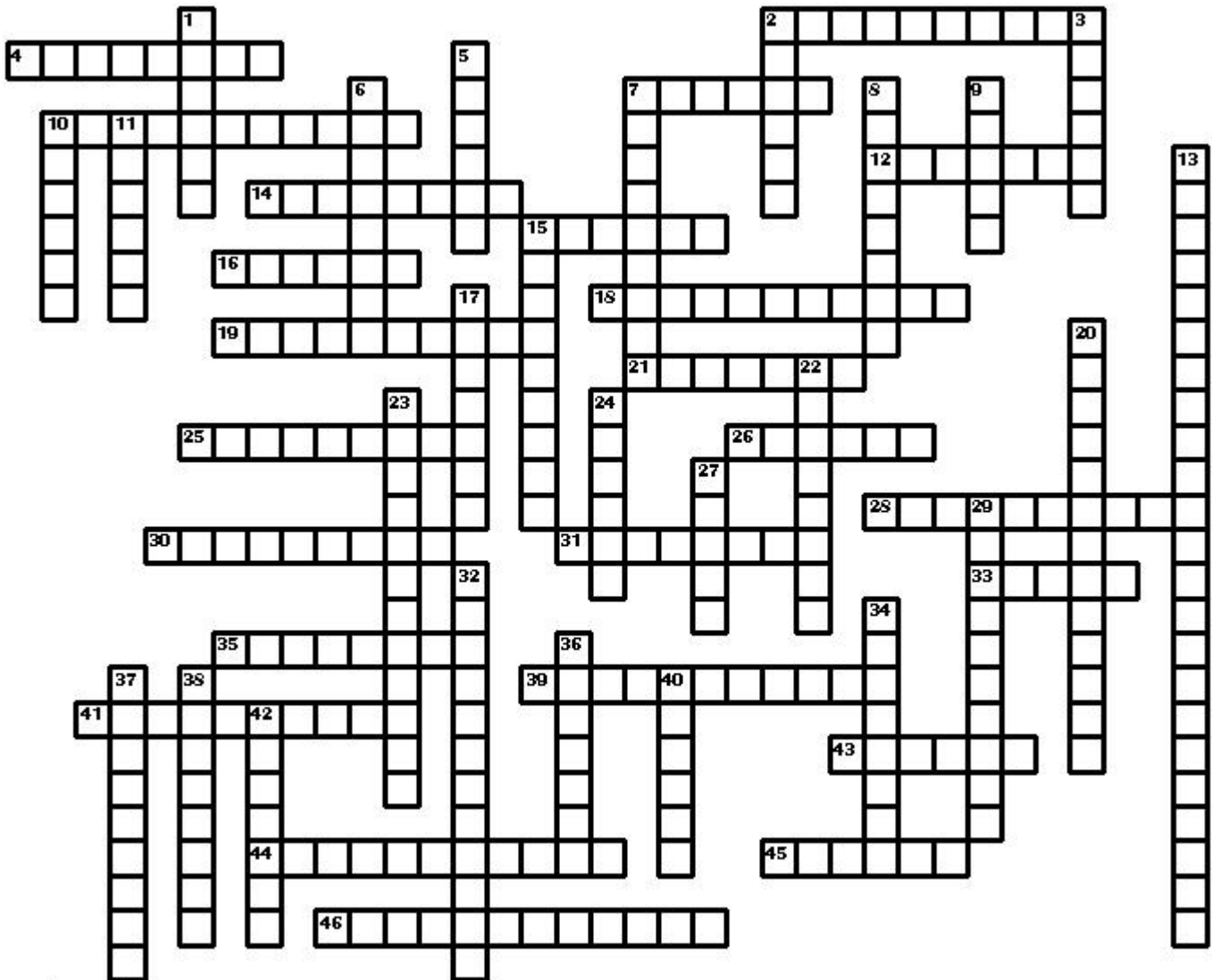
- 7.4 Red Team / Sandstorm (#22)** - At mile 7.4, on switchbacks in a mountainous section, vehicle went off course, got caught on a berm and rubber on the front wheels caught fire, which was quickly extinguished. Vehicle was command-disabled.
- 6.7 SciAutonicsII (#21)** - At mile 6.7, two-thirds of the way up Daggett Ridge, the vehicle went into an embankment and became stuck. Vehicle was command-disabled.
- 6.0 Digital Auto Drive (#7)** - At mile 6.0, vehicle was paused to allow a wrecker to get through and on attempting to resume motion, the vehicle was hung up on a football-sized rock. Vehicle was command-disabled.
- 5.2 The Golem Group (#9)** - At mile 5.2, while going up a steep hill, vehicle stopped on the road, in gear and with engine running, but without enough throttle to climb the hill. After trying for 50 minutes, the vehicle was command-disabled.
- 1.3 Team Caltech (#5)** - At mile 1.3, vehicle veered off course, went through a fence, tried to come back on the road, but could not get through the fence again. Vehicle was command-disabled.
- 1.2 Team TerraMax (#20)** - Several times, the vehicle sensed some bushes near the road, backed up and corrected itself. At mile 1.2, it was not able to proceed further. Vehicle was command-disabled.
- .75 SciAutonics I (#17)** - At mile 0.75, vehicle went off the route. After sensors tried unsuccessfully for 90 minutes to reacquire the route, without any movement, vehicle was command-disabled.
- .45 Team CIMAR (#4)** - At mile 0.45, vehicle ran into some wire and become totally wrapped up in it. Vehicle was command-disabled.
- .2 Team ENSCO (#13)** - Vehicle moved out smartly, but, at mile 0.2, when making its first 90-degree turn, the vehicle flipped. Vehicle was removed from the course.
- 0 The Blue Team (#16)** - Withdrew prior to start.
- 0 Team TerraHawk (#15)** - Withdrew prior to start.
- 0 Virginia Tech (#25)** - Vehicle brakes locked up in the start area and was removed from the course.
- 0 Axion Racing (#23)** - Vehicle circled the wrong way in the start area. Vehicle was removed from the course.
- 0 Team CajunBot (#2)** - Vehicle brushed a wall on its way out of the chute. Vehicle was removed from the course.
- 0 Palos Verdes High School Road Warriors (#10)** - Vehicle hit a wall in the start area. Vehicle was removed from the course.

Results of the 2004 DARPA Grand Challenge along with what brought upon each vehicle's "demise." Originally from "Life After DARPA's Grand Challenge 2004 - What Now" by Paul F. Grayson published in *PC AI Volume 17, Issue 6*.

Know Your AI-Q

Welcome to PC AI's feature that allows you to test your AI-Q. This is the next in a series of crossword puzzles on the various technical categories of AI. Future puzzle topics will include robotics, LISP, AI languages, expert systems, agents and many more. The answers will appear in the next issue.

This issue's subject is *Natural Language Processing*.



AI - Q

Across

- 2 The study of meaning within the context of a passage. This is the opposite of semantics.
- 4 Words that have no meaning alone but have meaning in the context of the passage. Pronouns, for example.
- 7 An algorithm that looks through words and compares them to grammar and a lexicon in order to determine if a sentence is formed.
- 10 A word that joins two sentences.
- 12 A list of words and their meanings. A dictionary is an example.
- 14 A spelling unit - in other words, a group of letters that is pronounced in one sound. Example - "-tion" at the of a word.
- 15 A word that provides additional information about a noun.
- 16 Masculine, Feminine or Neutral.
- 18 Computational _____ - The process by which computational methods are used to study phonetics and language.
- 19 indicates ownership. Often requires an apostrophe followed by "s".
- 21 The part of a sentence before the verb.
- 25 _____ Translation Networks - Tools used to represent grammar in human or computer language.
- 26 Textual representation of the universal quantifier. May also be written as an upside down capital A.
- 28 A type of sentence that makes a statement.
- 30 The meaning of words and sentences.
- 31 (2 words) A type of noun that can't be counted.
- 33 _____ person - the style of writing in which the writer is the subject (or one of the subjects) of the sentence.
- 35 The set of symbols used by a grammar. Also the set of letters you learned at a very early age.
- 39 Machine _____ - A technology that uses computers to decipher other languages.
- 41 A sentence that presents a command.
- 43 An ending added on to a word.

EZ-Xpert 3.0

Inference without the Engine!

EZ-Xpert is EZ to use!

- Wizards
- Fill-in-the-blank screens
- Debugger

End-users can build and maintain applications!

- Automatic verification
- Ready-to-compile code
- Implement changes in minutes

EZ-Xpert applications are Fast!

- Conflict Resolution
- Test 20,000 rules/second
- Fire 1,000 rules/second

Learn more about the EZ solution today!

Contact: AI Developers
(888) 327-9397
info@ez-xpert.com
www/ez-xpert.com

- 44 A phrasal category found within the parsed sentence. Also, a resident of the area that a legislator serves.
- 45 A variation of a verb that tells whether the action has been completed or not.
- 46 (3 words) The grammatical role that a word plays in a sentence.

Down

- 1 Description of a natural language system that can handle knowledge that deviates from the normal cases.
- 2 Added to the beginning of a word.
- 3 A sequence of symbols taken from an alphabet.
- 5 alternate name for a word. This includes any modifications made to the word.
- 6 A unit of language below the level of a word. In other words, these are put

- together to form words.
- 7 The study of the sounds of speech.
- 8 Omitting words from a sentence. Also refers to the symbol used to denote when words are left out.
- 9 _____ person - the style of writing in which the writer refers to someone else as the subject. Uses words like he/she/they.
- 10 A large collection of natural language data used for statistical analysis.
- 11 Singular or Plural.
- 13 (2 words) _____
Language - The language used to encode data.
- 15 A word that provides additional information about a verb.
- 17 A variation of language spoken by regional populations.
- 20 Determining the root and variations of a word.
- 22 words representing numbers.
- 23 (2 words) The noun that receives the action of the verb.
- 24 The way that words are combined into phrases.
- 27 A property of a verb that describes when the action occurred.
- 29 Occurs when the form of a word is changed however the base meaning is not. For instance, table and tables.
- 32 "Ouch!", for instance.
- 34 Greek, for example.
- 36 Substitute for a noun.
- 37 A case where the meaning of a word is not clear.
- 38 _____ node - the place in a network where parsing may stop.
- 40 _____ Engine - This tool may use natural language processing to find information based on user queries.
- 42 A, An, or The.

Do not miss next issue's puzzle and again test your AI-Q.

The solution to this puzzle will appear in the next issue.

Visual Prolog

Good News for Programmers

We gave ourselves the challenge to rethink the object paradigm, with the purpose of creating a simple and clear, but yet extremely powerful object system for Visual Prolog.

The result is a very powerful and safe programming language, which combines some of the best features of many programming paradigms in a consistent and elegant way.

Free for Personal, Education or Research use
click here

PROLOG DEVELOPMENT CENTER

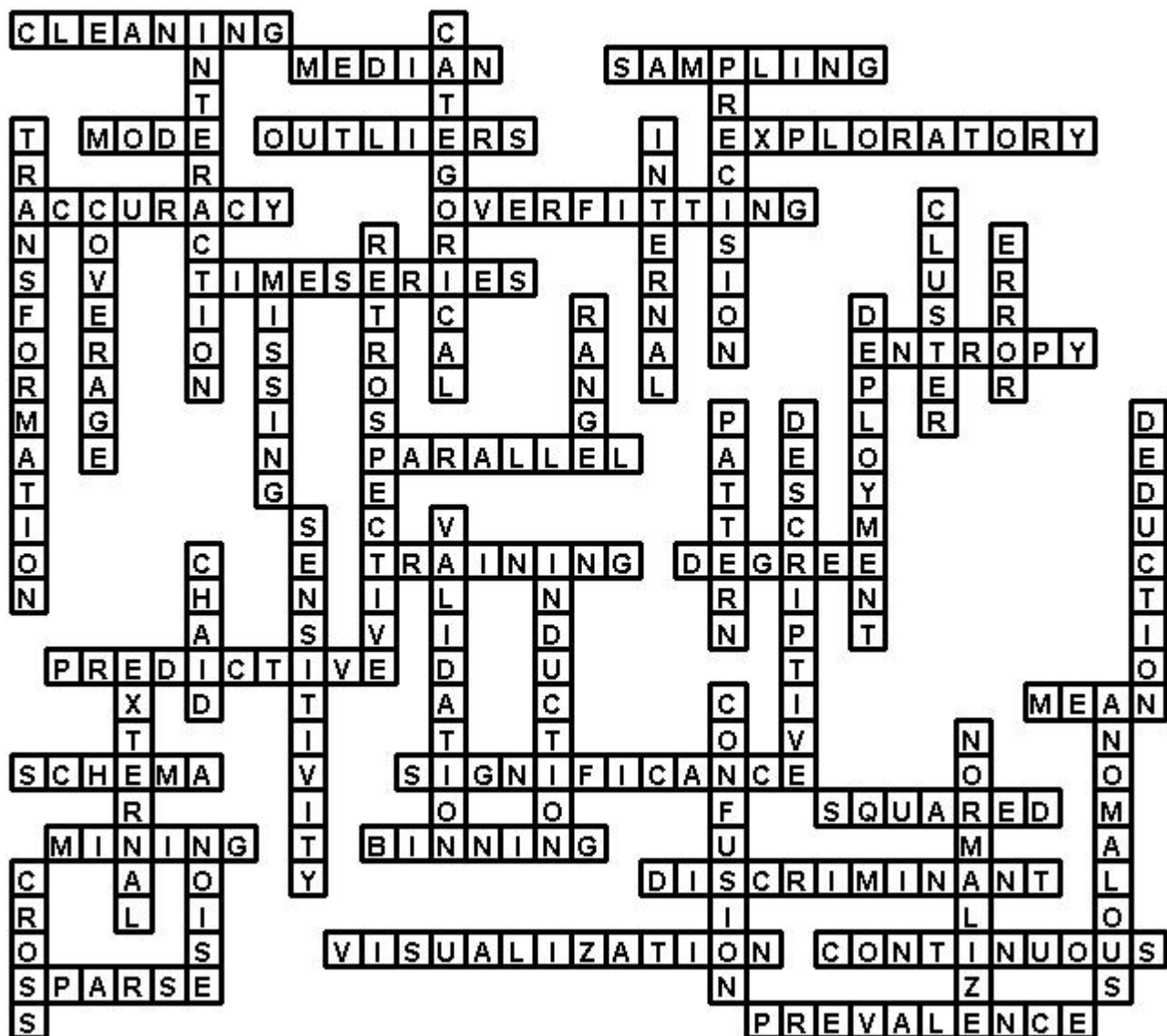
www.visual-prolog.com pdc@pdc.dk



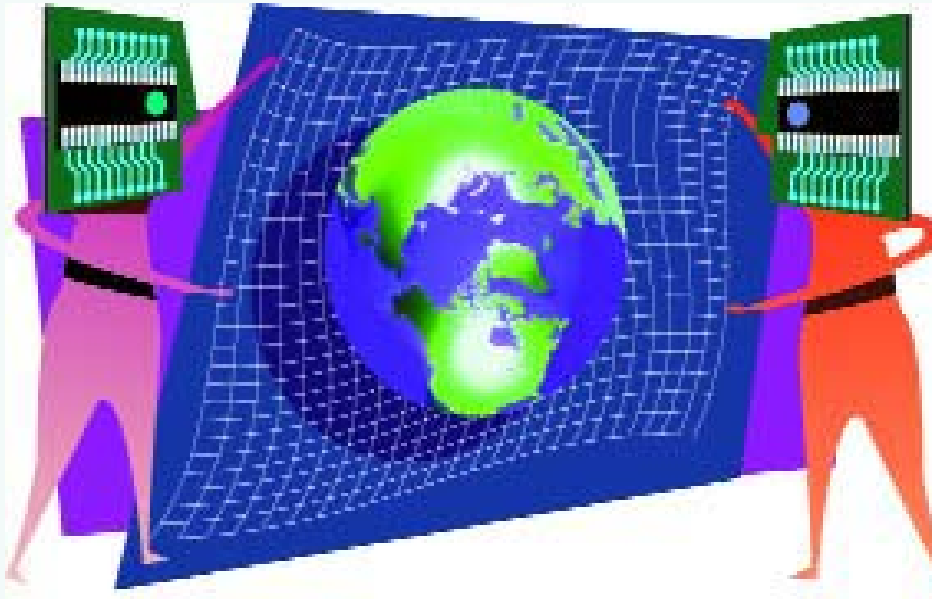
Looking for those technical articles you missed in any of our previous years --
Visit PC AI at www.pcai.com and search through 16 years of back issues.

Solution to 18.5 AI-Q Crossword Puzzle

The topic of this puzzle was *Data Mining and Modeling*



AI and the Net



**Search Engine
Semantics**

**Walking Assistance
Suit**

**Another Chess
Challenger**

**Self-Replicating
Robots**

and more

by Ilana Marks

Search Engine Semantics

Human memory relies on forming relationships between words and concepts. For instance, it is much easier to remember a list of terms if you create some sort of mnemonic connecting the words than if you just try to memorize everything. In addition, these connected concepts allow us to easily and quickly come up with related facts. For example, if someone mentions the general word "vegetable" you can probably list ten vegetables immediately without much thought. Despite this fact, search engines don't take into account words that might be related by context. This often makes it difficult to read through search results because they are not organized in the same manner that the human brain organizes information.

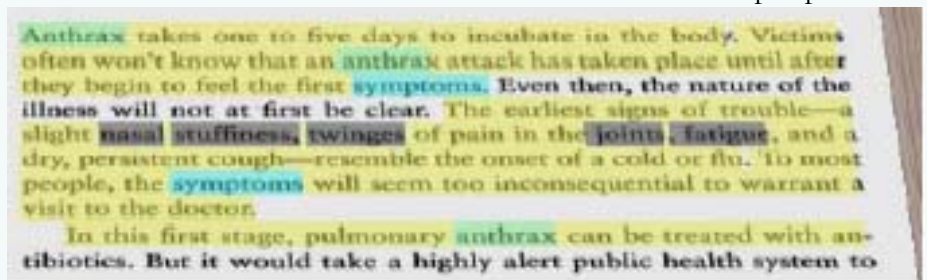
Researchers at Palo Alto Research Center have developed software that models information using methods similar to the human brain. This technology is called ScentHighlights. It works by combining the user's topics of

interest with related keywords. The user types in a query and then they narrow down the results by selecting specific topics of interest. The program then develops a set of keywords and other related words to find useful information. In the results, these keywords and queries are highlighted in different colors. This makes it easy for the user to skim through the results and pick out the relevant information. The new software can be combined with Palo Alto Research Center's ScentIndex tool which queries the index of an e-book to find relevant index entries. www.trnmag.com/Stories/2005/05040

5/Memory_mimic_aids_reading_050405.html

HAL Becomes Helpful

Mention the name HAL in the context of computers and the first thing you are liable to think of is the evil computer in 2001: A Space Odyssey. He was anything but helpful! However, researchers in Japan hope to revive the name of HAL in a more positive light. They are working on a robotic suit that provides strength to the wearer. This would be helpful for people with disabilities or people with




ScentHighlights uses different colors to highlight relevant passages and terms.

Image Source: <http://www-users.cs.umn.edu/~echi/papers/2005-IUI/2005-IUI-ScentHighlights.pdf>

strength impairments. The current prototype, called HAL 3 is basically a metal structure that fits over the wearer's legs. The structure has a built-in motor. In addition, the system is equipped with electrical sensors that pick up nerve signals within the muscles indicating whether it should contract or relax. The sensors then relay this information to the motor. The result is almost like a self-propelling vacuum cleaner - the user's natural movements are enhanced by the motor. Other HAL prototypes will assist the upper body, providing additional lifting power. The researchers are working on making the units less bulky and more

Visit the PC AI Store



Order Volume 16 on CD
6 Issues plus a bonus issue

Volume 17 Is Now Available

comfortable to wear.
www.newscientist.com/article.ns?id=mg18624945.800&feedId=online-news_rss20

Another Chess Challenger

Just when you thought you'd seen the last chess-playing computer along comes another challenger waiting to take on the

world's master players. This computer is called Hydra and it will play against Britain's top chess-player in June of 2005. Hydra's computer brains are in Abu Dhabi, however the match will be held long distance in London, England. The fact that the creators decided to name their computer after the many-headed mythological creature is perhaps appropriate - this computer is significantly faster than previous programs due to the combination of unique hardware and software elements. Specifically, Hydra uses Field Programmable Gate Arrays (FPGAs), which are special chips with high logic capacity that can be programmed. These chips allow the Hydra crew to easily update the programming and add new information without slowing down processor speed. Hydra also has databases of moves tailored to different parts of the game. After all, the types of moves a player makes to begin a game are not the same as moves toward the end of the game. So far, Hydra has beaten six grandmasters and ended in a draw against two more. It is able to calculate approximately 200 million moves every second and project the results up to 40 moves ahead - giving it just a "slight" advantage over its human competitor who can only consider a few moves every second. However, even with all of this computing power, it is still possible for the British champion

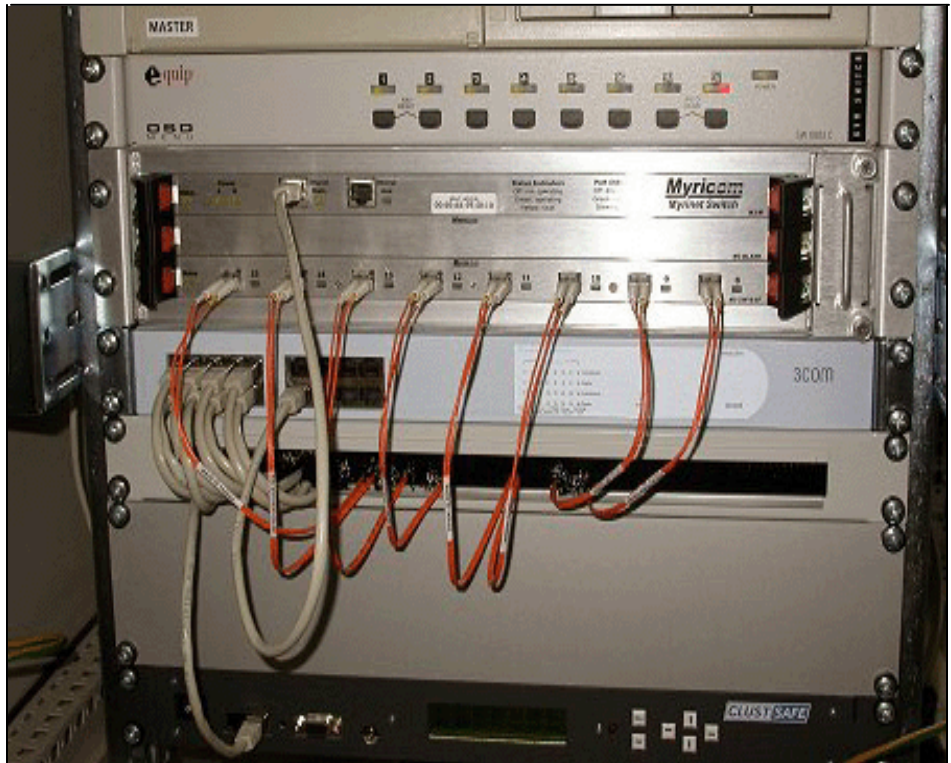


The HAL 3 system assists the user in walking.
 Image source: <http://www.cyberdyne.jp/ENG/hal.html>

to win with creativity and resourcefulness. The Michael Adams vs. Hydra challenge will occur June 21-26, 2005.
www.hydrachess.com/main.cfm or
<http://news.bbc.co.uk/1/hi/magazine/4576383.stm>

Robotic Double Take

Scientists at Cornell University have created robots that can "clone" themselves. No, these robots don't spend their time in a biology lab extracting robot "DNA" and injecting it into robot "cells." However, they are able to replicate themselves. Instead of biological replication, these robots use swiveling 10 centimeter building blocks with microprocessors that tell them how to respond when linked with other blocks. If the description sounds confusing, check out www.mae.cornell.edu/ccsl/research/selfr



Part of the Hydra chess-playing computer - many heads indeed!
 Image Source: <http://www.hydrachess.com/main.cfm?middle=cfm/hydra16.cfm>

NEW Version 7 Terabyte Indexer

The Smart Choice for Text Retrieval® since 1991

- ◆ over two dozen indexed, unindexed, fielded & full-text search options
- ◆ highlights hits in HTML, XML and PDF while displaying embedded links, formatting and images
- ◆ converts other file types (word processor, database, spreadsheet, email, ZIP, Unicode, etc.) to HTML for display with highlighted hits

Reviews of dtSearch

- ◆ "The most powerful document search tool on the market" — *Wired Magazine*
- ◆ "dtSearch ... leads the market" — *Network Computing*
- ◆ "Blindingly fast" — *Computer Forensics: Incident Response Essentials*
- ◆ "A powerful arsenal of search tools" — *The New York Times*
- ◆ "Super fast, super-reliable" — *The Wall Street Journal*
- ◆ "Covers all data sources ... powerful Web-based engines" — *eWEEK*
- ◆ "Searches at blazing speeds" — *Computer Reseller News Test Center*

See www.dtsearch.com for hundreds more reviews & case studies

1-800-IT-FINDS • www.dtsearch.com

Get the right answers to the right people at the right time.

**Don't just dish out data...
Make your web site "smart"
with expertise access!**

EXSYS knowledge automation software and consulting services capture the decision-making processes of experts in interactive online systems, which deliver individualized answers to prospects, customers and employees whenever and wherever needed.

Accessible 24/7, Exsys CORVID® interactive systems replicate "consultations" with your top-level experts. They can shorten sales cycles, assure compliance, improve customer and product support, handle routine tasks, analyze data streams, simplify reporting, and tackle many business "points of pain".

Contact an EXSYS rep today to find out how.



New ver. 3.2
Go to Exsys Site for
Demos and Case Studies
Download FREE
30-Day Evaluation with Tutorial



Expertise at Your Fingertips

www.exsys.com
+1.505.888.9494

[ep/video/4x4ht4a.wmv](#) for a very cool Windows Media video illustrating the process. These self-

replicating robots would be useful in situations where it is inconvenient or infeasible for

human repair technicians to fix damaged robots - such as on the battlefield or on the surface of another planet. In addition, the robot's ability to connect with other blocks allows it to change shape and build larger structures making the robot dynamic and able to adapt to various situations. www.newscientist.com/channel/mech-tech/mg18624997.100



The cloning robotic blocks designed at Cornell University. They swivel around and pick up additional blocks to build a replica of the original structure.

Image Source: www.mae.cornell.edu/ccsl/research/selfrep/video/4x4ht4a.wmv

Exploring Music

It is easy to recommend music within a particular genre. If someone says they like jazz music, it is fairly easy to come up with jazz albums and songs that the person may like. However, if that person is interested in seeking out music from other genres it is more

Visit PC AI at
www.pcai.com

difficult to recommend something they may like. In order to do that, you must look deeper into the reasons why a person likes a certain song - is it a certain charming turn of a lyric, the thump of the bass, the way the melody is constructed, or something else entirely? Of course, it is not easy to identify what factors make a song enjoyable to some people and not so to others. Therefore, it is useful to have recommendations from others with similar interests who have explored other types of music. Toward that goal, MusicStrands Inc. has created the MusicStrands Recommender which uses intelligent filtering algorithms. The user surfs around the website and adds tracks to their playlist. This leads to recommendations based on the surfing activity of other users. The site also presents popular searches that led up to and followed the selection so that users can "follow in the footsteps" of other music searchers. Users can listen to clips of the tracks to determine whether they like the music or not and either keep or delete it from their playlists. All of this creates a community where



A popular track from the MusicStrands website. Related tracks are also presented based on user's searches and playlists. Image Source: <http://www.musicstrands.com/action/detailTrack/trackId/1706970>

Build more powerful, scalable applications with Allegro CL and Lisp

Webify Seamlessly

Deploy applications over the internet with AllegroServe and other web/app servers

Easy Connectivity

Integrate applications with a variety of Java, XML, database, CORBA and COM/OLE tools

Get to market *on time* and *on budget* with Allegro CL and Lisp.

Find out why so many leading companies & top researchers won't program with anything else.

Free trial download!

www.franz.com

AllegroServe is a trademark, & Allegro CL is a registered trademark of Franz Inc. Copyright 2002 Franz Inc. All rights reserved.

people are able to explore new music with the help of their peers also searching the site.

www.gazettetimes.com/articles/2005/05/24/news/community/tue02.txt or www.musicstrands.com/

You Rang, Sir?

Collaboration of individuals in different countries is increasingly common today with the advancement of communication technologies. However, there are still communication barriers that must be overcome on these projects. In addition to the obvious language differences, there are also cultural differences that can be difficult to overcome. There is always something lost in translation between languages and these oversights can range from minor to highly offensive.

Therefore, a third party who understands the little nuances of different cultures would very useful for effective communication.

For this purpose, the IST Programme in the European Commission developed the FAME Information Butler. The FAME Butler is an intelligent agent that helps human interaction across cultural barriers without being highly noticeable. The system is presented on a table or wall display and it "listens" in to the conversation, presenting information based on the words it "hears." In addition, an intelligent video camera can record the conversation, focusing on the important details and shifting the camera angle to focus in on where the action is occurring. A parallel translation system uses speech

recognition features to translate different languages so that everyone understands one another. The researchers continue to develop the system and are looking to make components of the system commercially available in the near future.

<http://istresults.cordis.lu/index.cfm/section/news/tpl/article/BrowsingType/features/ID/76593> or <http://isl.ira.uka.de/fame/>



Order Back Issues,
Subscriptions, and PC AI
Volume 16 and 17 CDs
at
www.pcai.com/store

...Thinking Software

LPA's integrated suite of advanced software tools enables you to build intelligent applications both rapidly and safely.


LPA products feature:

- Robust and reliable run-time performance
- Support for DLLs, DDE, OLE, ODBC, TCP/IP, HTML standards
- Graphical tools and debugging aids
- Choice of delivery environment (VB, Java, Web, Delphi)

Modules include:

- LPA Prolog for Windows - leading Prolog compiler system
- Flex - popular hybrid expert system toolkit
- Agent - distributed agent toolkit
- Flint - fuzzy and probabilistic reasoning
- VisiRule - graphical expert systems generator

Logic Programming Associates Ltd

 www.lpa.co.uk info@lpa.co.uk
Phone: + 44 (0)20 8871 2016
Fax: + 44 (0)20 8874 0449

eclipse + **Amzi!**

With Eclipse:

- World class, multi-platform, extensible development environment
- Source code debugging for Prolog logicbases running in other programs and on remote (Web) servers
- Code outlines and project cross references
- Team development tools

You Can:

- Automate the logical rules and relationships that run an organization
- Develop integrated logic base components
- Use professional development tools and methodologies
- Customize knowledge representation and reasoning engines for individual application needs
- Apply advanced ontology concepts and develop semantic web applications

With Amzi!:

- World class, multi-platform, extensible Logic Programming tools
- ISO Standard
- High performance for 24/7 server deployment
- Large logicbase support
- Integrates seamlessly with Java/JSP, .NET, C#, VB, C++, Delphi and more

Download
www.amzi.com

THE BOOK ZONE

Algorithmic Learning in a Random World

Fuzzy Models and Algorithms for Pattern Recognition and Image Processing

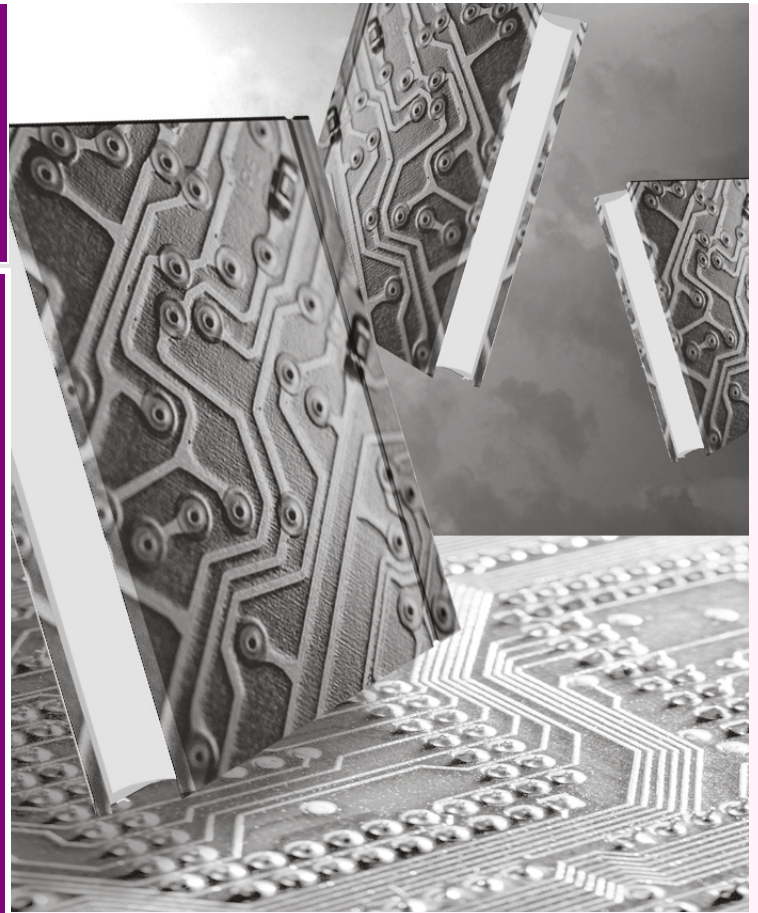
Artificial Intelligence Methods and Tools for Systems Biology

Building Intelligent .NET Applications

Mining Imperfect Data

Machine Learning Applications in Software Engineering

Handbook of Integrated Risk Management for E-Business



By Ilana Marks

Algorithmic Learning in a Random World by Vladimir Vovk, Alex Gammerman, and Glenn Shafer

This book presents current developments in using Kolmogorov's algorithmic notion of randomness to create computable approximations. These approximations have led to a new set of machine learning algorithms for making and testing predictions in high-dimensional spaces under the assumption that the data are independent and identically distributed. The book also discusses the limitations of such predictions, keeping in line with the randomness theory.

Table of Contents:

1. Preface
2. List of Principle Results
3. Introduction
4. Conformal Prediction
5. Classification with Conformal Predictors
6. Modifications of Conformal Predictors

7. Probabilistic Prediction I: Impossibility Results
8. Probabilistic Prediction II: Venn Predictors
9. Beyond Exchangeability
10. On-line Compression Modeling I: Conformal Prediction
11. On-line Compression Modeling II: Venn Prediction
12. Perspectives and Contrasts
13. Appendix A: Probability Theory
14. Appendix B: Data Sets
15. Appendix C: FAQ
16. Notation
17. References
18. Index

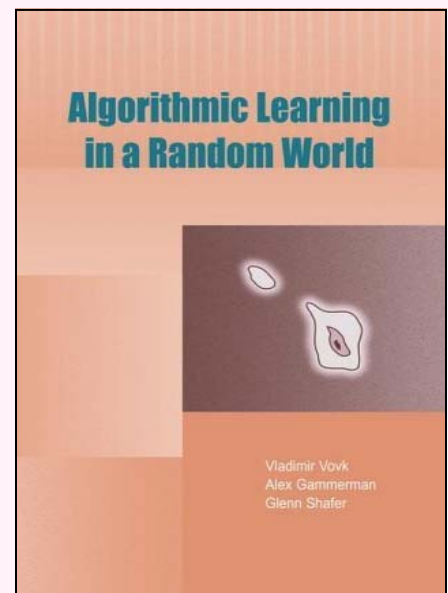
Algorithmic Learning in a Random World by Vladimir Vovk, Alex Gammerman, and Glenn Shafer, 2005, Springer, ISBN: 0-387-00152-2, Pages 324.

For more info:

<http://www.springeronline.com/sgw/cda/frontpage/0,11855,4-147-22-43142242-0,00.html>.

Fuzzy Models and Algorithms for Pattern Recognition and Image Processing by J.C. Bezdek, J. Keller, R. Krishnapuram, and N.R. Pal

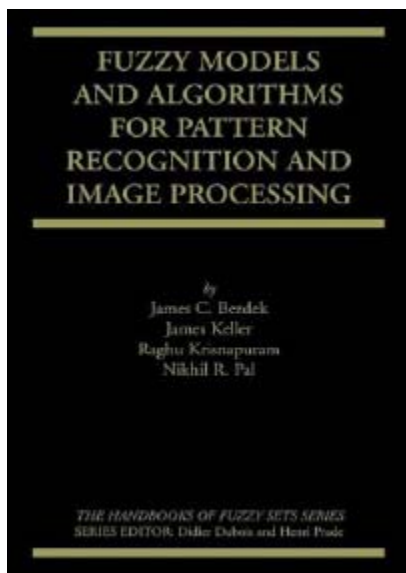
This book serves as an introduction to using fuzzy models in pattern recognition and image processing. Topics covered include



clustering and classifier design. Examples are provided along with figures and images. Application cases include medicine, character recognition, military image analysis and industrial engineering.

Table of Contents:

- Series Foreword
- Preface
- 1. Pattern Recognition
- 2. Cluster Analysis for Object Data
- 3. Cluster Analysis for Relational Data
- 4. Classifier Design
- 5. Image Processing and Computer Vision
- References
- Appendix 1: Acronyms and Abbreviations
- Appendix 2: The Iris Data: Table I, Fisher (1936)



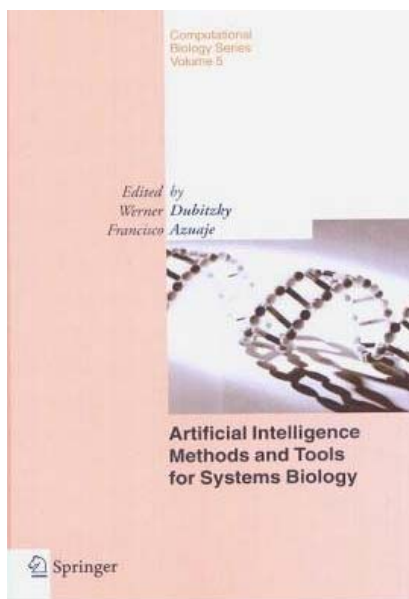
Fuzzy Models and Algorithms for Pattern Recognition and Image Processing by J.C. Bezdek, J. Keller, R. Krishnapuram, and N.R. Pal, Springer, 2005, ISBN: 0-387-24515-4, Pages: 776.

For more info:

<http://www.springeronline.com/sgw/cda/frontpage/0,11855,4-147-22-39598936-0,00.html>

Artificial Intelligence Methods and Tools for Systems Biology edited by Werner Dubitzky and Francisco Azuaje

This book presents design and research guidelines for the use of artificial intelligence in the study of systems biology. It focuses on life at the molecular level. The book is directed toward scientists, students and researchers so therefore it does not delve deeply into the mathematical background behind the AI methodologies. It also unifies terminology in order to make the text accessible to



researchers in a variety of biological disciplines.

Table of Contents:

- Preface
- 1. Lazy Learning for Predictive Toxicology based on a Chemical Ontology
- 2. QSAR Modeling of Mutagenicity on Non-Congeneric Sets of Organic Compounds
- 3. Characterizing Gene Expression Time Series Using a Hidden Markov Model
- 4. Analysis of Large-Scale mRNA Expression Data Sets by Genetic Algorithms
- 5. A Data-Driven, Flexible Machine Learning Strategy for the Classification of Biomedical Data
- 6. Cooperative Metaheuristics for Exploring Proteomic Data
- 7. Integrating Gene Expression Data, Protein Interaction Data, and Ontology-Based Literature Searches
- 8. Ontologies in Bioinformatics and Systems Biology
- 9. Natural Language Processing and Systems Biology
- 10. Systems Level Modeling of Gene Regulatory Networks
- 11. Computational Neuroscience for Cognitive Brain Functions
- *Index

Artificial Intelligence Methods and Tools for Systems Biology edited by Werner Dubitzky and Francisco Azuaje, Springer, 2004, ISBN: 1-4020-2859-8, Pages: 221.

For more info:

<http://www.springeronline.com/sgw/cda/frontpage/0,11855,4-40109-22-34830152-0,00.html>

Building Intelligent .NET Applications: Agents, Data Mining, Rule-Based Systems, and Speech Processing by Sara Morgan Rea

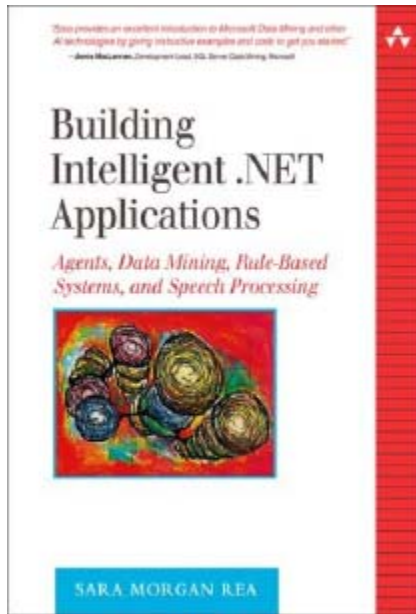
This book shows how artificial intelligence can be applied to .NET applications. Four different fields of AI particularly applicable to the .NET community are discussed: intelligent agents, data mining, rule-based systems, and speech processing. These topics are presented using real-world sample applications including automated call centers and the use of data mining in uncovering trends within data.

Table of Contents:

- 1. Introduction
- 2. Creating Applications that Talk
- 3. Telephony Applications

4. Multimodal Speech Applications
5. Data Mining Predictions
6. Applying Data Mining Predictions
7. An Evolving Database
8. Building an Agent
9. The Future of Enhanced Computing
- Glossary
- Bibliography
- Index

Building Intelligent .NET Applications: Agents, Data Mining, Rule-Based Systems, and Speech Processing by Sara Morgan Rea, Addison Wesley Professional, March 2005, ISBN: 0-321-24626-8, Pages: 312.



For more info:
<http://www.awprofessional.com/title/0321246268>

Mining Imperfect Data: Dealing with Contamination and Incomplete Records by Ronald K. Pearson

Databases often contain errors and anomalies that make it difficult to mine useful trends, conclusions, and predictions. This book discusses many of these errors and how to deal with them in the data mining process. Specifically, it presents the use of generalized sensitivity analysis for identifying errors. Generalized sensitivity analysis is a process that compares results gathered from analysis of interchangeable datasets and uses that comparison to identify anomalies. The book uses real datasets and published examples to illustrate the concept.

- Table of Contents:
- Preface
 - 1. Introduction
 - 2. Imperfect Datasets: Characters, Consequences, and Causes
 - 3. Univariate Outlier Detection
 - 4. Data Pretreatment
 - 5. What is "Good" Data Characterization?
 - 6. Generalized Sensitivity Analysis
 - 7. Sampling Schemes for a Fixed Dataset
 - 8. Concluding Remarks and

Build more powerful, scalable applications with Allegro CL and Lisp

Webify Seamlessly
 Deploy applications over the internet with AllegroServe and other web/app servers

Easy Connectivity
 Integrate applications with a variety of Java, XML, database, CORBA and COM/OLE tools

Get to market *on time* and *on budget* with Allegro CL and Lisp.

Find out why so many leading companies & top researchers won't program with anything else.

Free trial download!
www.franz.com

AllegroServe is a trademark, & Allegro CL is a registered trademark of Franz Inc. Copyright 2002 Franz Inc. All rights reserved.

Open Questions
Bibliography
Index

Mining Imperfect Data: Dealing with Contamination and Incomplete Records by Ronald K. Pearson, Society for Industrial and Applied Mathematics, April 2005, ISBN: 0-89871-582-2, Pages: 312.

For more info: <http://ec-securehost.com/SIAM/ot93.html>

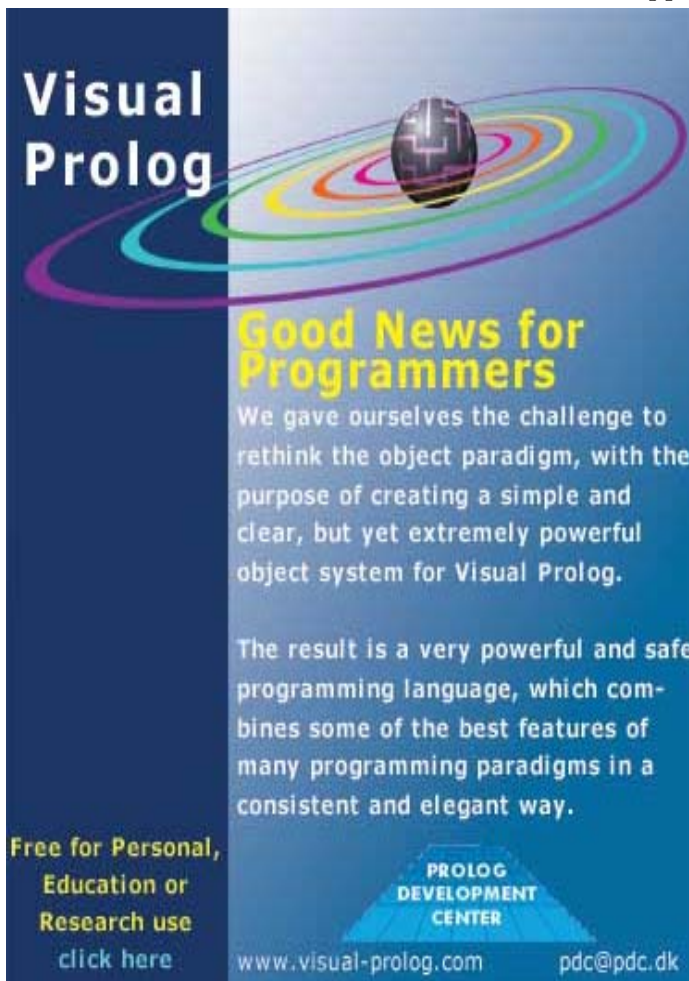
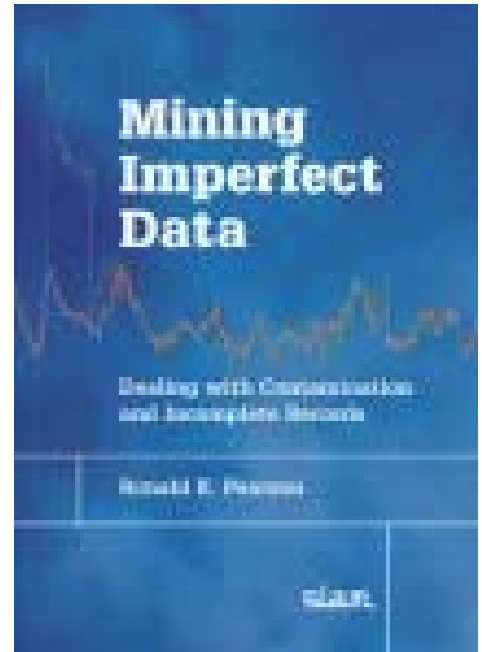
Machine Learning Applications in Software Engineering edited by Du Zhang and Jeffrey J.P. Tsai

This book presents applications of machine learning to software engineering as well as gives hints and guidelines for applying machine learning

principles in software engineering. The book starts out with an overview of machine learning and software engineering basics and then moves on to discuss individual application areas and the ways that machine learning was applied to them. Also included is a collection of research papers that offer a first-hand look into the applications.

Table of Contents:

1. Introduction to Machine Learning and Software Engineering
2. ML Applications in Prediction and Estimation
3. ML Applications in Property and Model Discovery
4. ML Applications in Transformation
5. ML Applications in Generation and Synthesis
6. ML Applications in Reuse
7. ML Applications in Requirement Acquisition
8. ML Applications in Management of Development Knowledge



Visual Prolog

Good News for Programmers

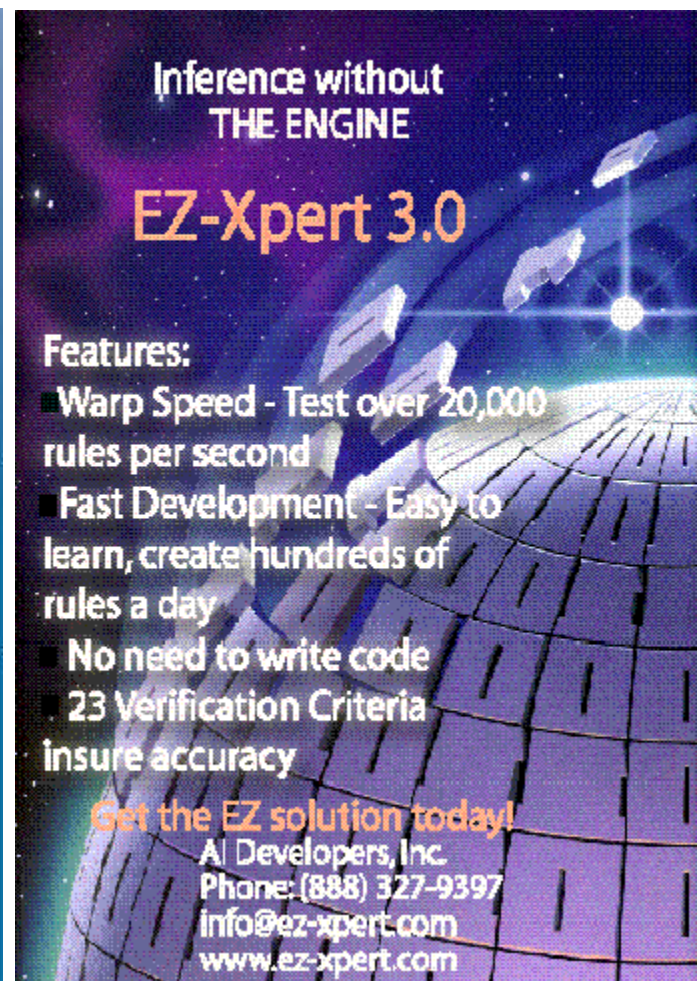
We gave ourselves the challenge to rethink the object paradigm, with the purpose of creating a simple and clear, but yet extremely powerful object system for Visual Prolog.

The result is a very powerful and safe programming language, which combines some of the best features of many programming paradigms in a consistent and elegant way.

Free for Personal, Education or Research use [click here](#)

PROLOG DEVELOPMENT CENTER

www.visual-prolog.com pdcc@pdcc.dk



Inference without THE ENGINE

EZ-Xpert 3.0

Features:

- Warp Speed - Test over 20,000 rules per second
- Fast Development - Easy to learn, create hundreds of rules a day
- No need to write code
- 23 Verification Criteria insure accuracy

Get the EZ solution today!

AI Developers, Inc.
Phone: (888) 327-9397
info@ez-xpert.com
www.ez-xpert.com

Machine Learning Applications in Software Engineering edited by Du Zhang and Jeffrey J.P. Tsai, World Scientific Publishing Company, February 2005, ISBN: 981-256-094-7, Pages: 368.

For more info:

<http://www.worldscibooks.com/compsci/5700.html>

Handbook of Integrated Risk Management for E-Business: Measuring, Modeling and Managing Risk edited by **Abderrahim Labbi**

This book reveals methods of managing risks in e-business using modeling techniques. It presents the e-business processes and the benefits and challenges that come with them as well as how to deal with uncertainty. It also discusses decision support system tools and their value in managing these risks. Also included are real-world case studies showing how modeling technologies allow for preemptive control of risks.

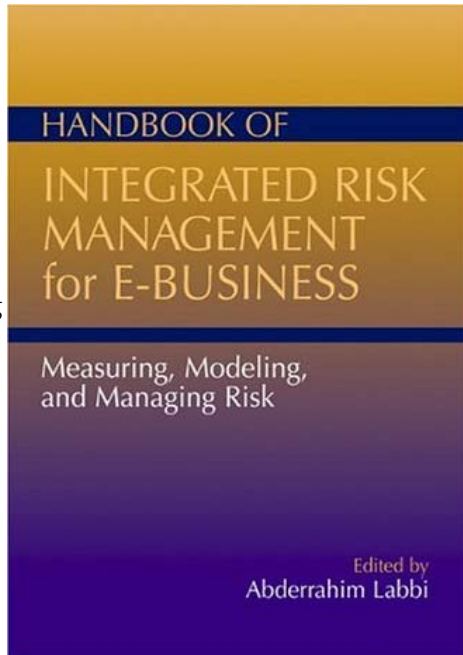


Table of Contents:

1. Enterprise Risk Management: A Value Chain Perspective
2. Integrated Risk Management
3. Human Factor Issues in Computer and E-Business Security
4. Managing Risks with Supply Chains: Using Adaptive Safety Stock Calculations for Improved Inventory Control
5. Securing Your E-Business by Managing Inherent IT Security Risks
6. A Predictive Model for E-Banks Operational Risk Management
7. Predictive Data Mining for Project Portfolio Risk Management
8. Elements of Financial Risk Management for Grid and Utility Computing

9. Service Level Agreements for Web Hosting Systems
 10. Optimal Control of Web Hosting Systems Under Service Level Agreements
 11. Sequential Risk Management in E-Business by Reinforcement Learning
 12. Predicting and Optimizing Customer Behaviors
- Index

Handbook of Integrated Risk Management for E-Business: Measuring, Modeling and Managing Risk by Abderrahim Labbi, J. Ross Publishing, February 2005, ISBN: 1-932159-07-X, Pages: 336.

For more info: <http://www.jrosspub.com/Engine/Shopping/catalog.asp?store=12&category=173&itempage=1&item=2813&itemonly=1>



...Thinking Software

LPA's integrated suite of advanced software tools enables you to build intelligent applications both rapidly and safely.


LPA products feature:

- Robust and reliable run-time performance
- Support for DLLs, DDE, OLE, ODBC, TCP/IP, HTML standards
- Graphical tools and debugging aids
- Choice of delivery environment (VB, Java, Web, Delphi)

Modules include:

LPA Prolog for Windows - leading Prolog compiler system
 Flex - popular hybrid expert system toolkit
 Agent - distributed agent toolkit
 Flint - fuzzy and probabilistic reasoning
 VisiRule - graphical expert systems generator

Logic Programming Associates Ltd

 www.lpa.co.uk info@lpa.co.uk
 Phone: + 44 (0)20 8871 2016
 Fax: + 44 (0)20 8874 0449

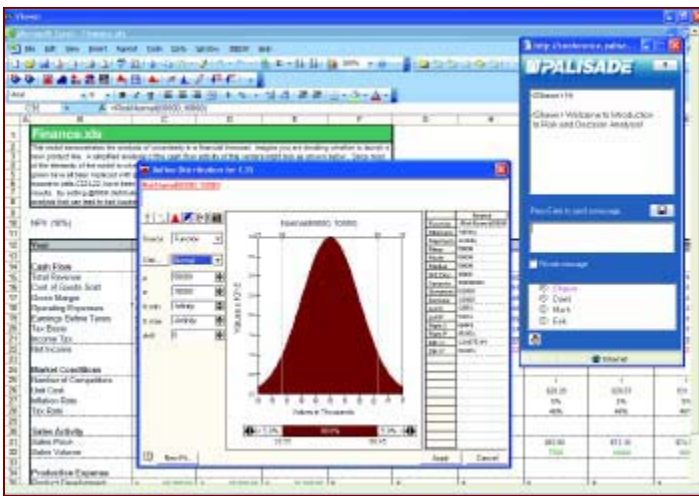
Continued from Page 17

in a script. Development tools include “copy/paste” of script lines from within the application generator and the ability to go to a specific line number during editing of the script. To enable editing a “find/find next” and “select line” or “select all” option is also provided. More information can be found at www.ivoice.com.

iVoice, Inc.
www.ivoice.com.

GENERAL ANNOUNCEMENT SECTION

Training



Quantitative Risk and Statistical Analysis Training

Palisade Corporation announces a series of live web seminars featuring an instructor with an interactive web session and telephone conference. The training presents similar material to their regional seminar series and will be offered on a regular basis. The next available training courses are Introduction to Risk and Decision Assessment II June 13-14 and Introduction to Risk and Decision Assessment I June 16-17, 2005. A combined four-day course will be offered July 18-22 and again over four days in August. Learning is hands-on, working directly with the software and the ability to share screens with the instructor. For more information and the schedule of courses visit www.palisade.com/live_web_training/

Palisade Corporation
www.palisade.com

Check out the new PC AI Store:
www.pcai.com/store

Conferences

AAAI 05 and IAAI-05

AAAI-05 and IAAI-05 will take place in Pittsburgh, PA July 9-13, 2005. These national conferences will celebrate the 25th anniversary of AAAI. Participants may visit Carnegie Mellon to explore some of the early origins of AI. This year's AAAI conference will institute a new competition to test the abilities of game playing systems by comparing performance over a gamut of games such as maze searches, tic-tac-toe, battleship, and chess. The second round will feature more complex games. The game playing systems will be required to read the rules of the games at the start of the competition and using runtime information provided by the game managers, express their moves in the best position to win legally within the least amount of time. A \$10,000 prize will be awarded at this competition sponsored by Stanford Logic Group, part of the computer science department at Stanford University, <http://games.stanford.edu>. Several events will focus on robots, <http://palantir.swarthmore.edu/aaai05/>, from pure exhibitions to competitions. Robots will face tests such as scavenger hunts as well as the challenge to actually attend the conference – including the mandatory volunteer duties. Both conferences will run on the same schedule and participants may move freely between sessions.

AAAI-05
<http://www.aaai.org/Conferences/National/2005/aaai05.html>

IAAI-05
<http://www.aaai.org/Conferences/IAAI/2005/iaai05.html>



4th Mexican International Conference on AI

MICAI 2005 will take place November 14-18, 2005 in Monterrey, Mexico. Keynote speakers include John McCarthy, Tom Mitchell, Erick Cantu, Katsushi Ikeuchi, and Jaime Sichman. The proceedings will be

published by Springer LNAI. Registration will begin soon.

MICAI 2005
www.MICAI.org/2005

Visit www.pcai.com Today

In Research and Development, Educated Guesses Aren't Good Enough.



With **@RISK** You Won't Have to Guess.

Research and Development is about discovery, advancement, and innovation. Leading scientists and engineers don't rely on "educated guesses"; they use estimation techniques and modeling tools to improve their probability of success.

Theories and assumptions are a good start in the R&D process but with Palisade's @RISK you can factor in all the variables and reduce the uncertainty you face. @RISK uses Monte Carlo simulation in Microsoft Excel so you can quickly create and simulate analytic models that provide insight into your most complex problems. You can count on it.

Download a FREE trial version or order @RISK today and SAVE \$250!

Use code PCAI2005 at www.palisade.com/pcai or when calling 800-432-7475 or 607-277-8000 in America. In Europe call +44 (0)20 7426 9950 and in Asia-Pacific call +61 2 9929 9799.

 **PALISADE**



The vendor's address, phone number, e-mails, and URL are in a separate table after the product information table.

Next issue: Business Intelligence, Data Mining, Computational Intelligence, Intelligent Applications, Intelligent Tutoring, Intelligent Web Searching, and Robotics

Contact PC AI for a submission form at bg@pcai.com

Buyer's Guide

Business Applications, Business Rule Automation, Computational Linguistics, Forecasting, Machine Translation, Natural Language Processing, Web Based Expert Systems

Special Note on System Requirements: When MS Windows appears, this assumes Win 95, 98, NT, ME, 2000, XP, A Pentium Processor, 32MB RAM and 32MB Disk space available unless stated otherwise.

Business Applications			
Product Company	Description	System Requirements	Price
Advisor Enterprise BNH Expert Software Inc.	Internet/Intranet based decision support tool provides analysis of the cost of training/learning activities. Data from all courses resides in a central database. Managers determine cost and resources required to run one or multiple training programs, gain required skills and competencies, track the money (salaries, travel, etc.), reduce costs, etc. Users access with a Browser.	Web browser, Java script enabled (IE 5.5/Net-scape 6.0) for navigation bar. 100 MB disk space.	\$295 for 1 year subscription.
ARTOptimize, MindBox Power Editor MindBox Inc.	Creates an individually-tailored financial package for a customer automatically, allowing complete personalization of every step in the loan origination and underwriting process. Leverages an institution's data and decision technology to complete the following: Integrates multiple source credit data; Analyze credit data according to company policy with explanations; Provides best possible price and list of conditions to be met to grant the loan; Suggests a list of debt consolidation strategies; Creates foundation for cross selling or upselling of HELOCs and line of credit products. Includes the MindBox Power Editor to maintain rules in a recognizable environment.	ODBC compliant database	Contact Vendor
ArulesXL Amzi! inc.	Develop, test and deliver business rule applications using Microsoft Excel spreadsheets. Integrates rule engine directly with the spreadsheet for spreadsheet numerical analysis and rule-based decision support interaction. Free pre-release, evaluation version at www.amzi.com for automated decision support of rule-based component applications -product pricing, loan approval and employee benefits analysis.	Microsoft Excel 2002 or later. Windows 98 or later.	\$99 Pre-Release Version Special
BitDefender Antivirus BitDefender Softwin SRL	Blocks malicious applications based on behaviour analysis for proactive protection against newborn viruses, Trojans, Internet worms, etc. Features heuristics for antivirus scanning, intelligent active content control, integrity checks and self-repairing code. Available for Windows, *nix file/mail servers and workstations.	Windows or Linux/Unix	Contact Vendor
CustomWise Design Power, Inc.	Web-based platform for engineering/design automation based on Design Power's Design++ product complemented with a Web Integration Manager (WIM). WIM module includes a user/project account management system and allows multiple Design++ processes for service requests directed to these accounts.	Windows NT + with IIS or Windows 2003 Server +	Contact Vendor
DecisionPro Vanguard Software	Integrated modeling tool supports decision tree analysis, forecasting, Monte Carlo simulation, linear program optimization, non-linear optimization, Markov simulation, rule-based expert systems, statistical analysis, and other analytic methods for business decision-making.	PC 800 Mhz, Windows 98/NT/2000/XP	\$495 - \$995 per user

Business Applications			
Product Company	Description	System Requirements	Price
DeepInsight DeepInsight.com	Combines quantitative analysis and neural networks to digest market data for statistically-optimal trading recommendations on stocks and mutual funds.	Web-server with CGI or Java Servlet capabilities.	\$399
Design++ Design Power, Inc.	Platform for engineering/design automation captures rules. Generates on-demand, complete product configurations and variant designs. Output consists of 3D CAD models and drawings and all required documents. Includes modules: Dynamic Configurator, for function and component configuration and selection; Execution Order Controller (EOC); Intelligent Change Manager (ICM) ; D++ Visual Modeler (DVM) ; D++ Rule Editor (DRE) using D++ Rule Language (DRL); Cad Integration Manager (CIM). Usable for design of large products and systems with 100,000+ components.	Windows NT+	Lease and perpetual licensing available per quotation
dtSearch Desktop with Spider dtSearch Corp.	Searches terabytes of word processor, database, spreadsheet, emails (with attachments), ZIP, XML, PDF, HTML, Unicode files and more in less than a second. Over two dozen indexed, unindexed, fielded and full-text search options. Highlights hits in all files; for HTML, XML & PDF, while displaying links and images. Built-in Web Spider. See www.dtsearch.com for downloadable evaluations.	MS Windows	\$199
dtSearch Network with Spider dtSearch Corp.	Searches terabytes of word processor, database, spreadsheet, emails (with attachments), ZIP, XML, PDF, HTML, Unicode files and more in less than a second. Over two dozen indexed, unindexed, fielded and full-text search options. Highlights hits in all files; for HTML, XML and PDF, while displaying links and images. Built-in Web Spider. See www.dtsearch.com for downloadable evaluations.	MS Windows	From \$800
dtSearch Publish dtSearch Corp.	Brings dtSearch's tools to CD/DVD publishing. Over a dozen indexed and fielded data search options. Highlights hits in HTML, XML & PDF, while displaying links and images. Converts "Office," ZIP, etc. files to HTML with highlighted hits. See www.dtsearch.com for downloadable evaluations.	MS Windows	From \$2,500
dtSearch Web with Spider dtSearch Corp.	Web-based engine publishes and searches Web content. Over a dozen indexed and fielded data search options. Highlights hits in HTML, XML & PDF, while displaying links and images. Converts word processor, database, spreadsheet, ZIP, etc. files to HTML, with highlighted hits. Built-in Spider expands searchable database to other sites; supports dynamically-generated content. Optional API for SQL, Java, and .NET. See www.dtsearch.com for downloadable evaluations.	Runs on IIS based Web sites. Linux version of Text Retrieval Engine also available.	From \$999
Exsys Selector RuleBook EXSYS, Inc.	Expert system software delivers expert knowledge to the customer via the Web. System recommends best products for the customer's requirements using conversational interface that emulates interaction a customer would have with an expert salesperson. System asks questions about requirements and use of the product. Based on user input, logical rules analyze products and product data maintained in a spreadsheet to rank and find products for the customer. Each product can be displayed with a detailed report on how it matches the customer's individual requirements. Customer is given specific recommendations they can act on immediately.	Contact Vendor	Contact Vendor
Intelligent Enterprise Search Consulting Stottler Henke Associates, Inc.	Uses AI techniques and a point-and-click user interface. Employees build a personal search "context" to enable the system to retrieve highly targeted results and filter out results unrelated to the search topic. Results are re-ranked by a measure of relevance to the topic; brings the most relevant results to the top. Search user interface is close to a standard user interface so integration can be seamless across the enterprise.	Desktop interface to enterprise search: Win98/Pentium III+, 256MB RAM and 20GB HD. Server: Contact Vendor	Contact Vendor
LPA Flex LPA	Hybrid expert system toolkit with frames, rules and procedures implemented within a logic programming environment. Employs an English-like Knowledge Specification Language for defining expertise in an intuitive manner. Supports both forward and backward chaining inferencing and various treatments of uncertainty including Bayesian Updating and Certainty Factors. Includes an automated questions and answer mechanism. Flex IDE includes browsers and graphing tools. Runtimes can be delivered within the Flex GUI or within a VB or Java or C/C++ GUI using the Intelligence Server toolkit from LPA.	MS Windows	Contact Vendor

Business Applications			
Product Company	Description	System Requirements	Price
LPA Prolog LPA	Comprehensive AI development suite and optional toolkits build sophisticated business applications. Supports logic-based reasoning and inferencing with knowledge representation. Direct programmatic access to Windows GUI and environment; option to package invisible intelligent components for integration with other languages and environments. Support for large corpora such as WordNet, DCG parsing and parse tree drawing utilities and efficient string handling routines.	MS Windows	Contact Vendor
Network Searcher BGSoft	Utility searches local area networks (LAN) for files. Allows viewing and searching of all hidden shares. Select target of scanning from whole network to any folder in any computer. Searches sharing (include hidden sharing), folders, files, files of a certain kind (e.g. mp3, avi, etc.) or for files containing specific text on all selected computers in the network in minutes.	LAN	\$34.95
PlantWise Design Power, Inc.	3D conceptual process plant modeling including equipment, structures and automatic routing of entire process piping networks. Includes heuristic and algorithmic rules captured from leading piping experts. Allows plant designers to iterate "what-if" alternatives to determine an optimal plant layout.	Windows NT+, MicroStation (Bentley, Inc.)	Contact Vendor
Thunderstone Search Appliance Thunderstone Software	Natural language, relevance ranking search engine for network files, document formats, and web pages. Filters all file types containing text. Automatically recognizes and removes duplicates and navigation menus. Similarity searching. User-controlled relevance weights. Spell checking based on vocabulary used by the indexed documents. Parses JavaScript and Flash content. Link popularity and parent/child link tracking. Menu-driven administration. Customizable user interface. Pattern matching algorithms for controlling indexer. Intelligent crawler learns how often each document needs reindexing. Query and error logging and reporting. Allows administrator to force results to top for designated queries.	Self-contained hardware/software package. Optional integration with applications via web services/XML.	Free Basic version. Premium versions \$700 and up.

Business Rule Automation			
Product Company	Description	System Requirements	Price
Amzi! Prolog + Logic Server Amzi! inc.	Integrates intelligent components with conventional applications; add business rule logic-bases for pricing, configuration, workflow, planning, and problem solving. Access logic-base of rules like a database. Rules expressed in Prolog with built-in search and pattern matching capabilities. Encapsulated as a Java Class (JSP and Servlets), C/C++ Class, .NET Class (VB, C#), Delphi Component, and DLL/SO API. Add Prolog predicates in Java, C/C++, C#, VB or Delphi. Eclipse IDE with source/remote debugger. Windows, Linux, Solaris, HP/UX. Free for personal and academic use.	Contact Vendor	\$0-\$1,499
ArulesXL Amzi! inc.	Develop, test and deliver business rule applications using Microsoft Excel spreadsheets. Integrates rule engine directly with the spreadsheet for spreadsheet numerical analysis and rule-based decision support interaction. Free pre-release, evaluation version at www.amzi.com for automated decision support of rule-based component applications -product pricing, loan approval and employee benefits analysis.	Microsoft Excel 2002 or later. Windows 98 or later.	\$99 Pre-Release Version Special
eMerge Business Integrity Server Sapiens	Rule-based technology suite maintains integrity of published processes, business rules and core proprietary practices of an organization. Consists of an active knowledgebase, the Business Logic Processor and interfaces for data management and communication. Supports visible and understandable business rules that embody corporate policies and procedures while accommodating constantly changing business conditions. Maintains traceability from the corporate policies through to the business rules and their technical implementation.	Core Rules Engine: z/OS, z/VM, OS/400, HP-UX. Data Access: DB2, Informix, Oracle, etc. Contact Vendor for more information.	Contact Vendor

Business Rule Automation			
Product Company	Description	System Requirements	Price
MetaCenter Data Advantage Group	Window into information systems environment to explore contextual and relational information stored in transactional, business intelligence, database, data integration, data quality and data modeling applications. Documents, audits and ties business requirements, rules and corporate standards to technical data underlying execution. Users collaborate in analyzing and managing knowledge represented in information systems. Institutionalizes knowledge, standards and unstructured information.	Platform independent, web-based, no client software needed. Windows/Linux/Unix	Contact Vendor
MindBox Power Editor MindBox Inc	Multilevel, scalable editing application modifies or updates automated business policies. Editor manages rules through an intuitive graphical user interface designed to use the paradigm and language of the business. MindBox provides the MindBox Power Editor with each of the components.	Java based application	Package d w/other products
Project Reporter CoGenTex, Inc.	Web-based viewer for project plans created in Microsoft Project or compatible project management software. Supports multiple client and server platforms. Put project schedules on the web and view project information using automatically generated natural language reports.	Server: Sun JDK/JRE 1.4; Windows/Mac/Unix. Client: Browser.	Starts at \$595 for 10 users.
VisiRule LPA	Graphical charting tool explores decision logic through executable flow charts. Generates Flex KSL code for embedding within larger processes.	MS Windows	Contact Vendor

Computational Linguistics			
Product Company	Description	System Requirements	Price
LPA Prolog LPA	LPA Prolog and its optional toolkits support logic-based reasoning and inferencing coupled with various forms of knowledge representation. Direct programmatic access to Windows GUI and environment; option to package invisible intelligent components for integration with other languages and environments. Support for WordNet, DCG parsing and parse tree drawing utilities and efficient string handling routines.	MS Windows	Contact Vendor

Forecasting			
Product Company	Description	System Requirements	Price
Alyuda Forecaster Neo Digital/ Alyuda Research, Inc.	Neural network for forecasting, classification and data mining. Wizard interface creates a neural network to analyze data. Special options for missing values, outliers and data entry errors detection. Data automatically scaled and encoded; supports date/time encoding. Standard Mode tailors data to a neural network, selects, trains, and solves classification or forecasting problem. Expert Mode has a range of data preprocessing options, training algorithms, stopping conditions and architecture search methods.	MS Windows, 128MB RAM, 5 MB hard disk space	\$249. Educational discounts available.
Alyuda Forecaster XL Neo Digital/ Alyuda Research, Inc.	Add-in for MS Excel with automatic neural network architecture and parameters selection for forecasting, classification and data analysis. Special options for missing values, outliers and data entry errors detection. Data is automatically scaled and encoded. Creates and trains a neural network using constructive algorithm with intelligent stopping conditions. Detailed reports available: data analysis, training with graph and table, performance with confusion matrix, errors graph, scatter plot, etc.	MS Windows, MS Excel, 128MB RAM, 5 MB hard disk space	\$149. Educational discounts available
ANNI Neural Science	Models and predicts stock prices using technologies in neural networks, genetic algorithms, statistical analysis, and technical analysis. Optimizes parameters and inputs via genetic algorithms to create systems. Beginners can utilize the system. Includes other investing utilities to assist traders in decision making..	Win98, ME, NT, 2000, XP, Online Access	Contact Vendor

Get the right answers to the right people at the right time.

Don't just dish out data... Make your web site "smart" with expertise access!

EXSYS knowledge automation software and consulting services capture the decision-making processes of experts in interactive online systems, which deliver individualized answers to prospects, customers and employees whenever and wherever needed.

Accessible 24/7, Exsys CORVID® interactive systems replicate "consultations" with your top-level experts. They can shorten sales cycles, assure compliance, improve customer and product support, handle routine tasks, analyze data streams, simplify reporting, and tackle many business "points of pain".

Contact an EXSYS rep today to find out how.



New ver. 3.2
Go to Exsys Site for
Demos and Case Studies
Download FREE
30-Day Evaluation with Tutorial

EXSYS
Expertise at Your Fingertips
www.exsys.com
+1.505.888.9494

Forecasting

Product Company	Description	System Requirements	Price
AutoBox Automatic Forecasting Systems Co. Inc.	Data and model warehouse structure builds Box-Jenkins models. Data management capabilities store the series, model forms (ARIMA and Transfer Function), error series, fitted values, forecasts, confidence intervals, and generated intervention series in the database. Access, manipulate and analyze series directly. Automates BJ model building by programming model identification, estimation and diagnostic feedback loop for ARIMA (univariate) and Transfer Function (multivariate or regression) modeling. Includes automatic intervention detection (level shifts, season pulses, single point outliers and changes in the variance of the series). Variables included in the model at your discretion.	Contact Vendor	From \$395
Braincel Promised Land Technologies	Neural net add-in to Microsoft Excel. Finds patterns in data, which allows prediction of future results based on those patterns. Used for horse racing, stock and futures market prediction, factory process control, and medical diagnosis, and more. Adds itself as another Excel menu, allows Excel to process and format data before training a neural net on that data.	Microsoft Excel Running on a Pentium	\$249
Custom Solution Wizard NeuroDimension, Inc.	Add-on takes a neural network created with NeuroSolutions and automatically generates and compiles a Dynamic Link Library (DLL), which can be embedded into a Visual Basic, Microsoft Excel, Microsoft Access, Visual C++, or ASP application. Use with TradingSolutions to develop custom neural network models for trading.	MATLAB 5+, MS Windows; 40MB Free Disk; 32MB RAM	\$795
DecisionPro Vanguard Software	Integrated modeling tool supports decision tree analysis, forecasting, Monte Carlo simulation, linear program optimization, nonlinear optimization, Markov simulation, rule-based expert systems, statistical analysis, and other analytic methods for business decision-making.	MS Windows	\$495 - \$995 per user

Forecasting


Product Company	Description	System Requirements	Price
FreeFore Automatic Forecasting Systems Co. Inc.	Freeware of AutoBox builds Box-Jenkins models (a super-set of regression and time series models ARIMA) for univariate and multivariate data. Automatic modeling heuristics (not pick best) with intervention detection. Tailors forecast model to the problem; selects best lead and lag structures for each input series. Identifies pulses, seasonal pulses, level shifts and local time trends to correct omitted variables; Adds structure through surrogate variables. Graphs autocorrelation, partial-autocorrelation and cross-correlation functions.	MS Windows	Free
NeuroShell Predictor Ward Systems Group, Inc.	Professional system solves forecasting and estimation problems by learning historical data. Includes TurboProp2 and genetic training methods. Reveals importance of inputs.	Windows 98, ME, XP, NT (SP 3 +), or 2000	\$545
NeuroSolutions NeuroDimension, Inc.	Neural network development software combines a modular, icon-based network design interface with an implementation of advanced learning procedures, such as conjugate gradients and backpropagation through time. Include C++ source code generation, customized components through DLLs, neuro-fuzzy architectures, and programmatic control from Visual Basic using OLE Automation.	MS Windows; 40MB Free Disk; 32MB RAM	\$195 - \$2,495
NeuroSolutions for Excel NeuroDimension, Inc.	Add-on product allows use of NeuroSolutions directly from Microsoft Excel. Highlight portions of data as training, cross validation, or testing within Excel, step through configuration panels, and create a working neural network. Configure another panel and Excel will graph results from a batch of experiments. Feature determines optimum network parameters.	MS Windows; 40MB Free Disk; 32MB RAM, NeuroSolutions	\$250
NeuroSolutions for MATLAB NeuroDimension, Inc.	Addition to MATLAB's technical computing capabilities allows users to leverage NeuroSolutions (www.neurosolutions.com) inside MATLAB and Simulink. Toolbox features 15 neural models, 5 learning algorithms and utilities integrated in an interface which allows neural network beginners to use the product.	MS Windows; 40MB Free Disk; 32MB RAM, NeuroSolutions	\$250
Predictive Suite Predictive Dynamix, Inc.	Integrated predictive modeling suite with neural network, regression, self-organizing maps, decision tree, bayesian, dynamic clustering, fuzzy logic, genetic algorithms, and simulated annealing modeling techniques. Automated variable selection for identifying key variables and variable interactions. Integrated graphical, statistical, and OLAP data analysis. Intelligent sampling for dataset reduction. Wizard mode for model building. Model training and validation process. Category and model lift analysis. Model deployment via ActiveX control in most common Windows application platforms.	Pentium class Windows platform. 128MB	Contact Vendor
TradingSolutions NeuroDimension, Inc.	Software combines traditional technical analysis with AI technologies to assist with trading decisions. Use any combination of financial indicators in conjunction with advanced neural networks and genetic algorithms to create trading models.	MS Windows; 40MB Free Disk; 32MB RAM	\$995 - \$1,995

Machine Translation

Product Company	Description	System Requirements	Price
Passport Language Engineering Company, LLC	Enables multilingual communication across intranets, extranets, and the Internet. Integrates translation window into web sites. Online content translated on-the-fly into chosen language. For online service, all translation of web pages and text resides on LEC's servers, but can appear as part of your web site using frames. Sample code provided to implement web-site localization and text translation. Direct translation between English and French, German, Spanish, Italian, Portuguese, Russian, Polish, Ukrainian, Arabic, Hebrew, Persian, Turkish, Japanese, Korean, and Chinese, Dutch. Composite translation engine allows for "two stage translations" such as Spanish-to-English-to-Japanese.	Contact Vendor	\$3,000

Visit the **PC AI Store** for Subscriptions, Back Issues, and CD Compilations www.pcai.com/store

Machine Translation			
Product Company	Description	System Requirements	Price
PetaMem Language Translation PetaMem GmbH	Machine translation system for client or server with custom-built languages: Czech, Dutch, English, French, German, Hungarian, Portuguese, and Swedish; plus reduced functionality for other languages with dictionaries: Croatian, Czech, Danish, Dutch, English, Finnish, French, German, Hungarian, Italian, Latin, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, and Turkish. Input from HTML, ASCII (ISO,WIN,UTF-8), RTF, PS, and others. Translation speed is 180 words per minute on Workstation; 9,700 words per minute on 50-CPU Cluster. Dictionaries available for other compatible MT systems.	UltraSparc64, pa-risc, p-series, x86 1GHz; Unix-OS (AIX, HP-UX, Solaris, Linux); 1GB RAM, 36GB HD space; and beowulf-cluster, browser, Mail-Client	Contact Vendor
Translate and Translate Pro Products Language Engineering Company, LLC	Individual language programs for translation tasks and translate add-ins for Microsoft Word, Excel and PowerPoint applications. LogoTrans translates as you type sentences, paragraphs or whole text. TransIt translates one-two sentences and inserts text into other applications (chat/instant messages). TransView window instantly translates arriving messages. Translation Mirror translates the primary window (web pages, email or documents). FileTrans translates whole files or folders, including HTML. Translate contains system dictionaries. Translate Pro contains a dictionary browser to search and browse dictionaries.	MS Windows and 725 MB of disk space	\$100-\$1,000 Multiple languages available
Translate DotNet Server SDK Language Engineering Company, LLC	SOAP-based client-server machine translation system allows control over the translation process of any of LEC's products. Includes translation engines for English to-and-from French, Italian, German, Spanish, Portuguese, Russian, Polish, Ukrainian, Hebrew, Chinese, Korean, and Japanese. SOAP communicates with a translation server, either one supplied by LEC, or with your own server. Client programs package text for translation in a well-formed XML message, and transmit using the HTTP web protocol to an LEC Translate DotNet server. That server processes the request, translates the text, and returns a well-formed result. Using XML messages, you are able to have full control of the translation process.	Contact Vendor	\$10,000



eclipse + **Amzi!**

With Eclipse:

- World class, multi-platform, extensible development environment
- Source code debugging for Prolog logicbases running in other programs and on remote (Web) servers
- Code outlines and project cross references
- Team development tools

You Can:

- Automate the logical rules and relationships that run an organization
- Develop integrated logic base components
- Use professional development tools and methodologies
- Customize knowledge representation and reasoning engines for individual application needs
- Apply advanced ontology concepts and develop semantic web applications

With Amzi!:

- World class, multi-platform, extensible Logic Programming tools
- ISO Standard
- High performance for 24/7 server deployment
- Large logicbase support
- Integrates seamlessly with Java/JSP, .NET, C#, VB, C++, Delphi and more

Download
www.amzi.com

Next Issue

Scheduled articles and Buyer's Guide Themes include:

- Business Intelligence
- Data Mining
- Computational Intelligence
- Intelligent Applications
- Intelligent Tutoring
- Intelligent Web Searching
- Robotics

Also scheduled in 19.1 are articles on Robotics, AI and the Net, AI Q crossword puzzle and the PC AI Bookzone.

Machine Translation			
Product Company	Description	System Requirements	Price
Translate Magellan and Magellan Business Language Engineering Company, LLC	Contains all translation systems, English <> Chinese - Simplified and Traditional, Japanese, Korean, Hebrew, French, Italian, German, Spanish, Portuguese, Russian, Polish and Ukrainian. Magellan contains 4 programs: LogoTrans translates as you type. TransIt translates a few sentences into other applications. TransView window instantly translates arriving messages. Translation Mirror translates the primary window. FileTrans translates whole files or folders, including HTML. Magellan Business contains Dictionary Browser to search, browse and create your own dictionaries.	MS Windows and 550 MB of disk space	\$600-\$1,200

Natural Language Processing			
Product Company	Description	System Requirements	Price
BitDefender Anti-Spam Softwin SRL	Text classifier based on heuristic and bayesian filtering with triple-layer, weighted decision approach to spam filtering for accuracy.	Linux mail servers, Microsoft Outlook	Contact Vendor
BrainBoost.com Search Engine BrainBoost	Automated question answering search engine; does not rely on human editors to locate answers. Uses Artificial Intelligence technology to understand the question and match it with relevant answers on the web.	Internet browser	Contact Vendor
dtSearch Text Retrieval Engine dtSearch Corp.	Adds dtSearch technology to applications. Supports SQL, Delphi, Java, C++, C++.NET, C#, VB.NET, ASP.NET and more. Over two dozen indexed, unindexed and fielded data search options. Highlights hits in HTML, XML & PDF, while displaying links and images. Converts "Office," ZIP, etc. files to HTML with highlighted hits. See www.dtsearch.com for downloadable evaluations.	Two versions: dtSearch Engine for Win and .NET and dtSearch Engine for Linux.	Contact Vendor
ISYS:desktop 7 ISYS Search Software	Newest version of ISYS Search Software's enterprise-class desktop and network search software. Windows client interface provides multiple query methods, on-the-fly categorization, results grouping/clustering, a taskbar search window, taxonomy tools, and support for 140 file formats and 30 languages. Offers natural language processing (NLP) to field particularly advanced and/or complex queries. ISYS' proprietary NLP technology uses several variables to ascertain the context of a query to enhance the relevance in results sets.	MS Windows, TCP/IP stack presented through WINSOCK v1.1 +. 32 MB RAM required (recom 256 MB). 85 MB hard disk space.	\$570 single user; contact vendor for network rates
ISYS:web ISYS Search Software	Sixth-generation, web-based enterprise search solution for websites and intranets. Search technology supports 30 languages and 140 file formats, including XML, Office documents, databases, PDF, WordPerfect, proprietary systems and more. Offers multiple query methods, including Natural Language Query using natural language processing (NLP) to rank and generate search results. Proprietary NLP technology uses several variables to ascertain the context of a query to enhance the relevance in results sets.	MS Windows, TCP/IP stack presented through WINSOCK v1.1 or later. 64 MB (recom 256MB). 100 MB (temp storage of query results).	Starts at \$5,000/server
IVR iVoice, Inc.	Windows 2000 application generator builds customer interactive voice applications for callers to access information stored in databases, text files, network drives, etc. Connects to any ODBC compliant database in addition to Microsoft Access, Microsoft Excel, dBase, dBII, Sybase, Microsoft FoxPro, Btrieve, Oracle and Microsoft SQL Server. Twenty+ built in database commands including one to write custom SQL commands. Information in databases accessible to clients over the phone, in real time, eliminating the need for live operator assistance to check account balances, order status, etc.	Windows 2000, Pentium III, Dialogic Voice Processing Card, 20.2 Gigabyte HD Drive. 56K Modem and Remote Software	Contact Vendor
LPA Prolog LPA	LPA Prolog and its optional toolkits support logic-based reasoning and inferencing coupled with various forms of knowledge representation. Couple with this is direct programmatic access to the Windows GUI and environment and the option to package up invisible intelligent components for integration with other languages and environments. Contains support for large corpora such as WordNet, DCG parsing and parse tree drawing utilities and efficient string handling routines.	MS Windows	Contact Vendor

Natural Language Processing

Product Company	Description	System Requirements	Price
ParaMind Brainstorming Software Program ParaMind Brainstorming Software	Generates new text from text pasted into the editor from any Windows or Mac program to logically expand the text in infinite ways. Configurable and expands any idea logically. Uses a database of 500 related Word Categories to multiply a sentence or idea. Word categories on any subject can be added, making it customizable. Word Categories become criteria into which your sentence is parsed, the results are merged into hundreds of pages of text files.	MS Windows; 250 MHZ/32 megs of RAM. Mac OS 7.5 to OS X in Classic Mode. 250 MHZ/32 megs of RAM.	\$19.95 - \$79.95 Professional Version
PetaMem Language Suite (PMLS) PetaMem GmbH	Includes machine translation, text categorization, text summarization, text correction, language identification and other functionality.	Contact Vendor	Contact Vendor
Proteus Conversational Interface Artificial Ingenuity, LLC	Interface utilized as a front-end to software applications; supports knowledge representation for expert-system style functionality. Architecture models state and contextual knowledge. <i>Brain</i> maintains <i>state</i> and <i>mode</i> specific structures, and facility for use of discrete facts, and <i>collections</i> which represent classes or <i>collections</i> of information. Fuzzy logic system references discrete or abstracted class information, and the current Brain State and Mode, from within the behavior determination functions, for behavioral models.	Demonstration and personal/educational versions: MS Windows, 100Mhz, 64MB RAM, 10MB free disk space	Contact Vendor

Visit the new PC AI Store at www.pcai.com/store for the Volume 16 CD, Back Issues, and Subscriptions to PC AI.

StatTools Excels at Statistics.



With No Learning Curve.

If you know Excel, you can use StatTools. StatTools from Palisade Corporation is an Excel add-in that replaces Excel statistics functions with an accurate, proven toolset. Get expert statistics where you need them. Save time, effort, and money. And you can easily create customized statistical procedures using Excel's built-in VBA language.

Download a free trial version at www.palisade.com/pcaist today.

Order StatTools and save \$250! Use code PCAI2005 at www.palisade.com/pcaist or when calling 800-432-RISK or 607-277-8000. In Europe call +44 (0)20 7426 9950.

Natural Language Processing			
Product Company	Description	System Requirements	Price
Quintus Prolog SICS AB	Integrates Prolog engine for developing applications with a development environment, tools for building graphical user interfaces, support for testing, debugging and optimizing programs and customizable I/O and memory management. Tools deliver stand-alone applications or modules that can be linked with code written in other languages for embeddable Prolog solutions. Suited for commercial applications and research projects.	Windows Sun Solaris HP-UX Digital Unix SGI IRIX IBM AIX	Contact Vendor
SICStus Prolog SICS AB	ISO standard compliant Prolog development system. Built around a Prolog engine with optional native code generation for Sparc processors. Suitable for large amounts of data and applications.	Contact Vendor	Contact Vendor
Speech Enabled AutoAttendant iVoice, Inc.	Engages callers in natural language dialog or transfers them to an extension by speaking the name of the person or department they wish to speak to. Uses customized dictionary of names and extensions. Schedule different greetings to play at a specified dates, range of dates or day of the week, or announce a limited time sale or upcoming event.	Windows 2000, Dialogic Voice Processing Card, 20.2 Gigabyte HD. 56K Modem and Remote Software	Contact Vendor
TEXIS Thunderstone Software	Tool suite develops knowledge management and intelligent indexing/search applications. Integrates natural language and relevance ranking technology with real-time SQL database operations. Sorting capability uses compound indexes to search and sort/group large record sets. Automatic categorizer module option. Customize settings including language, stemming rules, thesaurus, character set, and relevance algorithms. Fuzzy logic (approximate pattern matching). Searches multi-byte languages (Japanese, Chinese). Handles 15+ queries per second per CPU. Supports multiple integration techniques including scripts, API, and web services. Search databases, document collections, catalogs, and web content.	Linux/other major Unix platforms; Microsoft NT/XP/2000+. Includes database, search engine, web server; but integrates with other web servers and databases.	\$8,000 and up
Theseus Word Recognition System Artificial Ingenuity, LLC	Proprietary fuzzy-logic word algorithm recognizes words too misspelled or jumbled for human recognition. Used with any system requiring human input, such as word processing, data entry, communications, etc. Downloadable demonstration version uses a limited version of the Theseus engine. Commercial version uses a multiple agent competing architecture to maximize recognition capability. Free personal/educational licenses.	Demonstration and personal/educational versions: MS Windows, 100Mhz, 64MB RAM, 10MB free disk space	Contact Vendor
VisualText Text Analysis International, Inc.	Extracts information from text, powering applications such as content analysis, e-intelligence, knowledge management, eCRM, and text mining. Features NLP++ general programming language with specializations for text analysis. VisualText analyzers blend grammars, patterns, keyword, and statistical paradigms in a multi-pass framework. Analyzers maintained by annotating text samples and letting the system create and generalize rules automatically. Development environment emphasizes a modify-and-test development cycle, text analyzers and knowledge base can be compiled for optimized performance. TAIParse general analyzer and runtime API customizes and deploys text analysis capabilities.	MS Windows, 500MHz Pentium III; 128MB RAM; 250MB hard disk space; Administrator permission on WinNT and Win2K.	Contact Vendor

Web Based Expert Systems			
Product Company	Description	System Requirements	Price
Acquire Acquired Intelligence	Builds and deploys expert system applications stand-alone or on the web. KnowledgeBase editor captures and organizes relevant knowledge without gaps or inconsistencies, and the embedded Inference Engine tests your rule-based application. Software Development Kit builds custom interfaces or embeds your application into other software. Educational discounts available at <i>info@aiinc.ca</i> . Free evaluation at <i>www.aiinc.ca</i> .	MS Windows f	\$1,995

Web Based Expert Systems

Product Company	Description	System Requirements	Price
Amzi! Prolog + Logic Server Amzi! Inc.	Integrates intelligent components with conventional applications; add business rule logic-bases for pricing, configuration, workflow, planning, and problem solving. Access logic-base of rules like a database. Rules expressed in Prolog with built-in search and pattern matching capabilities. Encapsulated as a Java Class (JSP and Servlets), C/C++ Class, .NET Class (VB, C#), Delphi Component, and DLL/SO API. Add Prolog predicates in Java, C/C++, C#, VB or Delphi. Eclipse IDE with source/remote debugger. Windows, Linux, Solaris, HP/UX. Free for personal and academic use.	Contact Vendor	\$0-\$1,499
DecisionScript Author Vanguard Software	Builds web-based applications that apply AI and classic decision sciences techniques. Applications include automated help desks, online sales assistance, and real-time management information processing.	MS Windows	\$995 per developer
DecisionScript Server Vanguard Software	Complete HTTP Web server hosts applications created using DecisionScript Author.	MS Windows	\$3,995/CPU Server
dtSearch Desktop with Spider dtSearch Corp.	Searches terabytes of word processor, database, spreadsheet, emails (with attachments), ZIP, XML, PDF, HTML, Unicode files and more in less than a second. Over two dozen indexed, unindexed, fielded and full-text search options. Highlights hits in all files; for HTML, XML & PDF, while displaying links and images. Built-in Web Spider. See www.dtsearch.com for downloadable evaluations.	MS Windows	\$199
dtSearch Network with Spider dtSearch Corp.	Searches terabytes of word processor, database, spreadsheet, emails (with attachments), ZIP, XML, PDF, HTML, Unicode files and more in less than a second. Over two dozen indexed, unindexed, fielded and full-text search options. Highlights hits in all files; for HTML, XML and PDF, while displaying links & images. Built-in Web Spider. See www.dtsearch.com for downloadable evaluations.	MS Windows	From \$800
dtSearch Publish dtSearch Corp.	Brings dtSearch's tools to CD/DVD publishing. Over a dozen indexed and fielded data search options. Highlights hits in HTML, XML & PDF, while displaying links and images. Converts "Office," ZIP, etc. files to HTML with highlighted hits. See www.dtsearch.com for downloadable evaluations.	MS Windows	From \$2,500
dtSearch Web with Spider dtSearch Corp.	Web-based engine publishes and searches Web content. Over a dozen indexed and fielded data search options. Highlights hits in HTML, XML & PDF, while displaying links and images. Converts word processor, database, spreadsheet, ZIP, etc. files to HTML, with highlighted hits. Built-in Spider expands searchable database to other sites; supports dynamically-generated content. Optional API for SQL, Java, and .NET. See www.dtsearch.com for downloadable evaluations.	Runs on IIS based Web sites. Linux version of Text Retrieval Engine also available.	Contact Vendor
Exsys CORVID EXSYS, Inc.	Deliver decision-making knowledge, situation-specific answers and recommendations to prospects, clients and staff. Emulates a conversation with a human expert. Use for product selection, troubleshooting, tech support, diagnostics, regulatory compliance, predictive maintenance, automating routine tasks, capturing expertise/procedures, and bring knowledge assets and interaction to your Web site and wireless communications. Client-side or server-side delivery. Design can match the "look-n-feel" of existing Web sites. Modularize the system with Logic Block structure. Systems generate customized and automated email response and reporting. Combine expertise - several developed systems can be merged together. 30-day free demo at www.exsys.com , development/deployment services available.	MS Windows (NT 4.0 w/SP 3), MS Internet Explorer 5, 75 MB Free Disk Space, Min Screen Resolution: 1024 x 768 with standard fonts or 1156 x 864 with large fonts	\$9,995+
Kaidara Advisor Kaidara Software	Retrieval engine operates as a web-based server built on three core technologies that collect, retain and reuse the experience gained in the past to recommend and guide customers and internal staff in solving complex technical support problems. Foundation allows interactions in multiple languages and through multiple channels via single source. Knowledge repository is automatically created and maintained. Applicable for web self-service and contact center environments, or as stand-alone field service applications.	Contact Vendor	Contact Vendor

Web Based Expert Systems			
Product Company	Description	System Requirements	Price
Kaidara Studio Kaidara Software	Kaidara Domain Architect configures and administers Kaidara Advisor. Administrator configures and refines indexing and interpretation parameters, weighting factors and sets user roles and privileges.	Contact Vendor	Contact Vendor
Kaidara Text2Data Kaidara Software	Tool indexes and transforms materials for inclusion in a knowledgebase. Reconciles vocabulary in source materials against a standard vocabulary and automatically extracts structured information from tree-text documents.	Contact Vendor	Contact Vendor
myAcquire Acquired Intelligence	Deliver ACQUIRE expert system application on the web using the myACQUIRE hosting service and ready-made HTML template screens or design your own. Visit www.myacquire.com for demonstrations or contact info@myacquire.com for a free evaluation.	Contact Vendor	Subscription
Udiagnose UReason Holding B.V.	Real-time on-line process diagnosis with model based reasoning. Web-based interactive intelligent decision support with e-mail alerts based upon exception management. Topology based reasoning and real-time on-line cause-effect analysis, advanced event handling, data reduction, fault trees and browsing. 100% pure graphical development and presentation with on-line explanation facilities.	Contact Vendor	Server: €5000 Standard Edition
WebFlex LPA	Hybrid expert system toolkit with frames, rules and procedures implemented within a logic programming environment. Employs an English-like Knowledge Specification Language for defining expertise in an intuitive manner. Supports both forward and backward chaining inferencing and various treatments of uncertainty including Bayesian Updating and Certainty Factors. Includes an automated questions and answer mechanism. Flex IDE includes browsers and graphing tools. Runtimes can be delivered within the Flex GUI or within a VB or Java or C/C++ GUI using the Intelligence Server toolkit from LPA.	MS Windows	Contact Vendor

Vendor Address			
Company	Address	Phone and Email	Web Address
U.S. Vendors			
Amzil inc.	47 Redwood Road Asheville, NC 28804	828.350.0350 info@amzi.com	www.amzi.com
Artificial Ingenuity, LLC	20701 N. Scottsdale Rd., Ste 107, PMB#129 Scottsdale, AZ 85255	480.539.4917 info@artificialingenuity.com	www.artificialingenuity.com
Automatic Forecasting Systems	P.O. Box 563 Hatboro, PA 19040	215.675.0652 sales@autobox.com	www.autobox.com
BrainBoost.com		646.641.5842 questions@brainboost.com	www.brainboost.com
CoGenTex, Inc.	840 Hanshaw Road, Suite 1 Ithaca, NY 14850	607.266.0363 info@cogentex.com	www.cogentex.com
Data Advantage Group, Inc.	604 Mission Street Suite 700 San Francisco, CA 94105	415.947.0400 info@dag.com	www.dag.com
Design Power, Inc.	10020 North De Anza Blvd. Cupertino, CA 95014	408.366.6600 info@dp.com	www.dp.com
dtSearch Corp.	6852 Tulip Hill Terrace Bethesda, MD 20816	800.IT.FINDS sales@dtsearch.com	www.dtsearch.com
Exsys, Inc.	2155 Louisiana Blvd. NE Ste 3100 Albuquerque, NM 87110	505.888.9494 info@exsys.com	www.exsys.com
ISYS Search Software	8775 E. Orchard Rd. #811 Englewood, CO 80111	800.992.4797 info@isys-search.com	www.isys-search.com
iVoice, Inc	750 Highway #34 Matawan, NJ 07747	732.441.7700 information@ivoice.com	www.ivoice.com
Kaidara Software	330 Distel Circle, Suite 150 Los Altos, CA 94022	650 417.2350 iinfo@kaidara.com	www.kaidara.com
Language Engineering Company, LLC	215 Washington Street Belmont, MA 02478	617.489.4000 info@lec.com	www.logomedia.net

Vendor Address			
Company	Address	Phone and Email	Web Address
U.S. Vendors			
MindBox, Inc.	300 Drake's Landing, Suite 155 Greenbrae, CA, 94904	415.785.3050 or 877.650.MIND <i>infor@mindbox.com</i>	www.mindbox.com
Neo Digital, Inc. (Alyuda Research Inc.)	1450 Frontero Ave Los Altos, CA 94024	650.941.1452 <i>sales@alyuda.com</i>	www.alyuda.com
Neural Science	PO Box 883 Ocean Shores, WA 98569	<i>Info@NeuralInvesting.com</i>	www.neuralinvesting.com
NeuroDimension, Inc.	1800 N. Main Street, Suite D4 Gainesville, FL 32609	352.377.5144 or 800.634.3327 <i>info@nd.com</i>	www.nd.com
ParaMind Brainstorming Software		<i>paramind@paramind.net</i>	www.paramind.net
Predictive Dynamix Inc.	3715 Gramercy Houston TX, 77025	713.592.5840 <i>contact@predx.com</i>	www.predx.com
Promised Land Technologies	195 Church Street 11th Floor New Haven, CT 06510	203.562.7335 <i>support@promland.com</i>	www.promland.com
Sapiens Americas - Cary, NC	2000 CentreGreen Way, Ste 240 Cary, NC 27513	919.405.1500 <i>usa@Sapiens.com</i>	www.sapiens.com/en/usa
Stottler Henke Associates, Inc.	1107 NE 45th St., Suite 310 Seattle WA 98105	206.545.9327 <i>info@stotterhenke.com</i>	www.stottlerhenke.com
Text Analysis International, Inc.	1669-2 Hollenbeck Ave. # 501 Sunnyvale, CA 94087	408.746.9932 or 877.235.6259 <i>info@textanalysis.com</i>	www.textanalysis.com
Thunderstone Software	14837 Detroit Ave #303 Cleveland, OH 44107	216.820.2200 <i>info@thunderstone.com</i>	www.thunderstone.com
Vanguard Software Corp	1100 Crescent Green Cary NC 27511	919.859.4101 <i>info@vanguardsw.com</i>	www.vanguardsw.com
Ward Systems Group, Inc.	5 Hillcrest Drive Frederick, MD 21703	301.662.7950 <i>sales@wardsystems.com</i>	www.wardsystems.com

Vendor Address			
Company	Address	Phone and Email	Web Address
Canadian Vendors			
Acquired Intelligence Inc.	205 - 1095 McKenzie Avenue Victoria, BC, V9B 3H9	250.479.8646 <i>info@aiinc.ca</i>	www.aiinc.ca
BNH Expert Software Inc.	4000 Steinberg Street St. Laurent, QC, H4R 2G7	514.745.4010 <i>info@bnhexpertsoft.com</i>	www.bnhexpertsoft.com
Vendors Outside North America			
BGSoft	Pushkina ave. 33-113 Belarus, Minsk, 220092	<i>bgsoft@bgsoft.net</i>	www.bgsoft.net
LPA	Studio 4, RVPB, Trinity Rd London England, SW18 3SX UK	+44.20887. 12016 <i>info@lpa.co.uk</i>	www.lpa.co.uk
PetaMem GmbH	Flurstr. 78 Fürth, Deutschland, D-90765	+420 284 819 93-0 <i>info@petamem.com</i>	www.petamem.com
SICS AB	Box 1263 Kista, Sweden SE16429	4686331570 <i>sicstus-request@sics.se</i>	www.sics.se/sicstus
SOFTWIN SRL / BitDefender	5, Fabrica de Glucoza Street Bucharest, Romania, 020331	40212330780 <i>sales@bitdefender.com</i>	www.bitdefender.com
UReason Holding B.V.	Rooseveltstraat 18V Leiden, The Netherlands, NL-2321 BM	+31-71-5281700 <i>info@UReason.com</i>	www.ureason.com

Join the Artificial Intelligence Discussion Group
<http://groups.yahoo.com/group/pcai/join> or mail to: pcai-subscribe@yahoogroups.com

ADVERTISER INDEX

Select the company name to automatically transfer to the company's home site of interest

<u>Company</u>	<u>Pages</u>
AI Developers	21, 27 36, 48,
Amzi	10, 13, 44, 58
Applied Business Intelligence	65
dtSearch	8, 11, 16 31, 41
Exsys Inc	19, 25, 42, 56
Franz Inc	4, 14 43, 47 66
LPA	15, 20, 27, 44, 49
Out of Toner	65
Palisade	51, 60
PC AI Back Issues	3
PC AI CD	6
PDC	9, 12, 17, 37, 48
QMC	2
The Modeling Agency	65

**Submit your product(s)
for the
PC AI Buyer's Guide to
bg@pcai.com**



**How Will You Approach
Data Mining?**

Data Mining: Levels I, II & III
Strategy - Methods - Practice

Vendor-neutral public courses
in Washington DC, Orlando
Las Vegas and San Diego

PC AI Subscribers: Register Early
and Save \$200! Full Course Details:

www.the-modeling-agency.com/pcai-special
(888) 742-2454

Out Of Toner.com

hp laserjet 4000/4050 (C4127X) - \$79.00

hp laserjet 4200 (Q1338A) - \$99.00

hp laserjet 4300 (Q1339A) - \$105.00

**Call
480-922-8922**

www.OutOfToner.com



Applied Business Intelligence

Apply advanced technology to improve:

**Strategic Advantage,
Identify Theft,
Information Technology**

**Fraud Detection,
Terrorism Risk Analysis,
Risk Analysis**

Available technologies include:

**Data Mining
Data Warehousing
Business Modeling
Machine Learning
Statistical Analysis
Declarative Methodology**

**Data Architecture
Business Forecasting
Business Automation
Decision Systems
Web-based Distribution
Neural Networks**

Contact us directly at (602) 363-0702

Expand your
possibilities,
not your **code**

with **Allegro CL[®] and Lisp.**

Faster Development:

Evolve and adapt your application while it's running. Eliminate the "edit-compile-link-run-test" cycle.

Increased Productivity:

Maximize development efforts by taking advantage of programmable macros, automatic memory management and crash-proof bug-trapping.

Webify Seamlessly:

Deploy your application over the Internet with AllegroServe and other commercial web/app servers.

Easy Connectivity:

Integrate applications with a variety of Java, XML, COM/OLE, database and CORBA tools.

Fully Supported:

All licenses include one year's support. Lisp training classes and consulting also available.

Allegro CL helps you make the most of your code. Experience for yourself why many of today's most successful companies and top researchers won't use anything else.

Free trial copy!
Download yours today at
<http://www.franz.com/>
info@franz.com



AllegroServe is a trademark, and Allegro CL is a registered trademark of Franz Inc.