AI Update By Douglas Blank

NEWS

Welcome once again to intelligence *news! Here, I attempt to provide useful summary, occasional commentary, and sometimes practical pointers to some of the more interesting news items connected to the practice of artificial intelligence. If you notice such a newsworthy item, please send me a note at* d.blank@csce.uark.edu. *Otherwise, I'll have to make things up.*

Robots Building Robots

Brandeis University researchers Jordan Pollack and Hod Lipson have created a genetic-based system that designs and actually builds simple robots. Their evolutionary programming system evolved, in simulation, three-dimensional structures, complete with neural controllers and simulated actuators.

The system is part of the GOLEM project (Genetically Organized Lifelike Electro Mechanics). The goal of the project is to create simple electro-mechanical machines capable of physical locomotion.

The simulator in which the machines evolve attempts to capture as many properties of the real world as possible, including friction and gravity. After the machines have evolved for awhile in the simulator, the structures are then physically "printed" in plastic using rapid prototyping techniques.

The plastic pieces are then assembled (by humans) and plugged into a computer running their associated
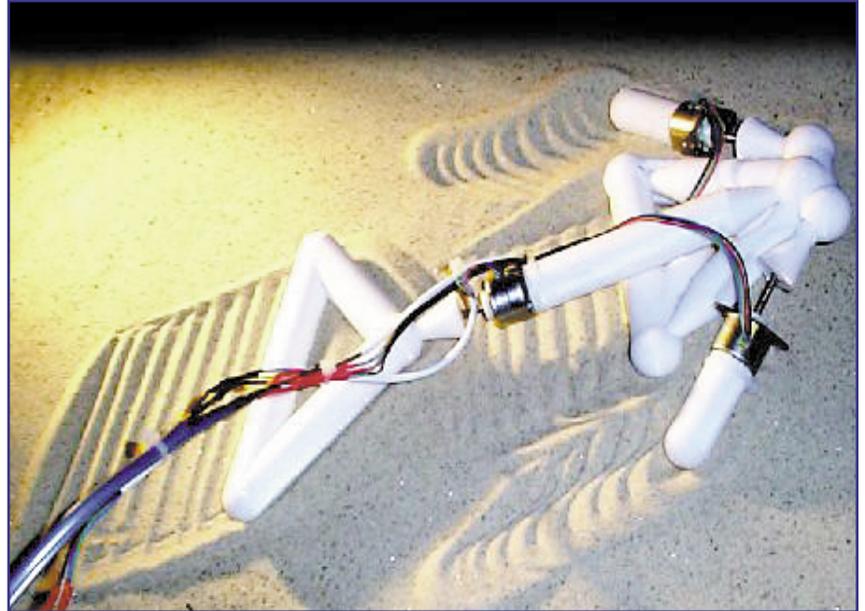
The amazingly symmetric "arrow," a robot designed and built by artificial intelligence and rapid prototyping techniques. Humans still had to name it, however.

neural controller. Lipson and Pollack claim that this is the first time robots have been robotically designed and fabricated. A full account of their experiments appear in the August 31,

2000 issue of *Nature.*

The GOLEM source code can be downloaded from their Web site at golem03.csi.brandeis.edu/download. html.

Programs are Not Protected Speech, Says Judge

Although not strictly an AI news item, many feel that the following may be one of the most important computing issues of our time. A U.S. District Judge has ruled that the code, reverse-engineered, this past summer for decrypting DVD files is not protected speech, and that its creation and publication violates the 1998 Digital
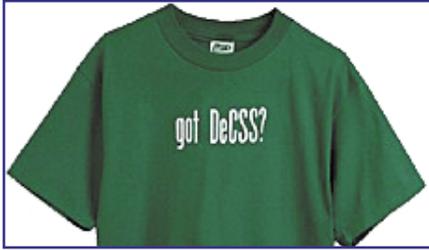
Millennium Copyright Act.

The code in question (called DeCSS) was originally written by a young hacker wanting to watch DVD movies under Linux, the open source/free software operating system. Universal City Studios et al. have sued people that have made the code available for download on the Internet.

Even stranger, the Judge has issued a preliminary injunction in the case prohibiting the defendants from distributing the computer code, or even having links to other sites that distribute it!

What this means is that there are some programs that you just can't write and give to your friends. Not even a printout. You can't put the program on your t-shirt and wear it around town. You can't even sing a description of the program on your front lawn.

To show the ridiculousness of these

Expert Advice for the AI Researcher

ChipCenter (www.chipcenter.com) is a new website that consolidates editorial content, demand creation, and e-commerce transactions in one spot. Of particular interest is their EE Experts section. Here they offer information, direction, and problem solutions to working EE's and designers.

ChipCenter has 25 such EE experts who regularly make their expertise accessible to thousands of readers. One of the reasons their EE Experts section has gained such success, ChipCenter claims, is that their experts enjoy enormous freedom in their choices of subject matter and how they make it accessible to their readers.

As an EE expert, Peter Raeth writes a column on adaptive systems every two weeks. Raeth is a computer engineer with Ball Aerospace & Technologies Corp. He is also working on his doctorate in computer science at NOVA Southeastern University. In his columns Raeth has covered an impressive array of topics ranging from Artificial Neural Network-controlled flight to building an expert system.

The articles are quite deep, covering terms, patents, and resources on each topic covered. As a testament to ChipCenter's editorial freedom, Raeth has written about even getting a PhD. You'll find Raeth's columns at www.chipcenter.com/eexpert/praeth.

CopyLeft, the creator of this DeCSS t-shirt, is being sued over what this t-shirt has printed on it. The shirt says "Got DeCSS?" on the front, and a representation of the code that plays DVD's is on the back. You can purchase the shirt at www.copyleft.net. The code was reversed engineered.

restrictions, David Touretzky, Principal Scientist in the Computer Science Department and the Center for the Neural Basis of Cognition at Carnegie Mellon University, has made a gallery of the many ways one might distribute source code. You can find it at www.cs.cmu.edu/~dst/DeCSS/Gallery/. Hopefully the freedom of code will win out.

AI HYPE WATCH

Our eye on AI continues. As noted in previous columns, of all fields, it is probably easier for those in artificial intelligence to make claims that are just a little bit beyond reality. This section of the news is dedicated to keeping ourselves in check, and to keeping a watch on those news makers that have made extraordinary statements. Of course, sometimes hype is not our fault. Sometimes the media tends to exaggerate just a tad. Hype happens. In any case, we'll report what we find here. If you encounter a report in the press, or directly from the researcher's mouth that you think fits the bill, send us a note at hypewatch@dangermouse.uark.edu.

Cruelty to Robots?

Peter Remine has begun work on creating the American Society for the Prevention of Cruelty to Robots, or ASPCR. The ASPCR Web site states that their goals are to "foster serious discussion about the ethics surrounding treatment and usage of increasingly complex robotiforms; to raise human awareness of artificial creatures, their culture and history; and to create a formal organization dedicated to the establishment and preservation of robot rights, and the prevention of cruelty to all robots."

The ASPCR Web site (www.aspcr.com) promises to feature discussions and opinions from artificial intelligence researchers, roboticists, and hobbyists on the subject of cruelty as it relates robotiforms. Remine broadly defines a "robotiform" as any artificial creature with basic sentient capacities. However, Remine does admit that there are no such robotiforms yet.

It is Remine's hope that eventually the ASPCR may become more involved in active participation of preventing cruelty to future robotiforms, much as the American Society for Prevent of Cruelty to Animals (ASPCA) sponsors legislation and programs designed to prevent cruelty to animals.

Who (or What) Wants to be a Millionaire?

The publishers of Apostolos Doxiadis' novel *Uncle Petros and Goldbach's Conjecture* are offering one million dollars to anyone who can prove Goldbach's Conjecture by the year 2004. Recall, Goldbach's Conjecture states that every even number (greater than two) is the sum of two primes. It was originally proposed in 1742 by Christian Goldbach. An image of Goldbach's letter to Leonhard Euler can be found at www.informatik.unigiessen.de/staff/richstein/ca/goldbach.jpg, and more information on the contest can be found at www.faber.co.uk/faber/million_dollar.asp?PGE=&ORD=faber&TAG=&CID=
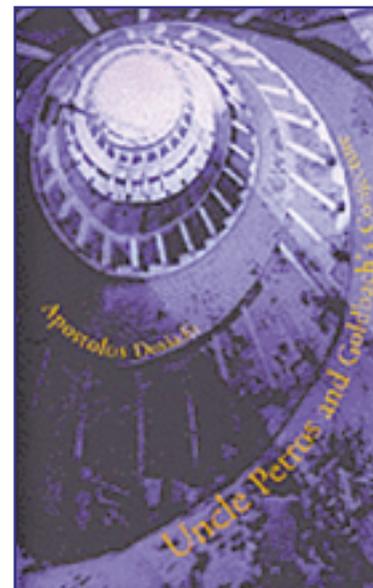
The U.K. Post Office is sponsoring a contest on optical character recognition, with entries in Java. For more information, see algoval.essex.ac.uk.

Nominations are currently being sought for the biennial $100,000 David E. Rumelhart Prize for formal analysis of human cognition, funded by the Robert J. Glushko and Pamela Samuelson Foundation of San Francisco. See www.cnbc.cmu.edu/derprize/.

The Secure Digital Music Initiative (SDMI) is offering $10,000 to the first person to crack any of its "digital watermarking" codes. Open source proponents are vowing to stay away from the contest though. Many see such schemes as getting in the way of their legal "fair use" of music, and don't want to help SDMI debug their code.

John Hopfield and Carlos Brody have announced a neural computation competition for neuroscientists. They have programmed a small spatio-temporal network that plausibly models a biological system and have put up the challenge attempt to identify the implemented function. See neuron.princeton.edu/~moment.

Cover of Uncle Petros and Goldbach's Conjecture *by Apostolos Doxiadis.*

Cruelty to Robots?

Do we need to start thinking about such issues? "Just recall," Remine writes, "that in 1899 (the ASPCA's founding date), most people considered the concept of ethics as applied to animal treatment to be absurdly ridiculous. Today you can actually be fined or jailed for animal cruelty, and millions of dollars are spent each year to advance the causes of the ASPCA and related organizations." Of course, animals did exist in 1899, a slight breakdown in the analogy.

Remine, who is actually a Seattle musician, is also attempting to draft the Bill of Robotic Rights. "If anyone has any ideas or would like to help develop this historic document, please let me know," Remine writes. Probably not the same method the other historic Bill of Rights was created.

Cool Projects of the Month

The Palm Pilot Robot Kit (PPRK) is a design for an easy-to-build, fully autonomous robot controlled by a Palm hand-held computer. The design comes from two Carnegie Mellon Robotics Institute research groups: the Toy Robots Initiative and the Manipulation Lab.

The goal of the project was to enable just about anyone to start building and programming mobile robots at a modest cost, and they have achieved the goal wonderfully.

The Palm makes a great robot controller: it packs a lot of computational power in a small size, runs on batteries, and as a bonus, can display graphics and an interactive user interface.

The PPRK base uses three "omni-wheels" that allow driving in any direction with independent control of rotation. The base also has three optical range sensors to "see" in the environment up to about a meter away.

The complete construction plans and software are documented on their Web site at www.cs.cmu.edu/~pprk/. The entire robot can be constructed from standard parts using glue, tape, and a small amount of soldering. The software provided can be compiled on a Windows PC using the free Code Warrior Lite compiler and then downloaded to the Palm. The robot can then drive itself around on flat surfaces, using optical range sensors

Rules and Nets

Does connectionism permit the reading of rules from a trained neural network? A panel discussion on this question took place this past July at the International Joint Conference on Neural Networks (IJCNN'2000) in Como, Italy.

The panel was composed of AI luminaries Dan Levine, Lee Giles, Noel Sharkey, Alessandro Sperduti, Ron Sun, John Taylor, Stefan Wermter, Paul Werbos, and Asim Roy. This was the fourth panel discussion at the IJCNN conferences on fundamental ideas in connectionism.

The bone of contention debated by the panel was that the basic connectionist framework as outlined by David Rumelhart and James McClellend, in their many books and papers, have no mechanism for rule extraction (reading of weights, etc. from a network) or rule insertion (embedding rules into a neural network) as is required by many rule-learning mechanisms.

According to Asim Roy, this is not a dispute about whether humans can learn rules from examples. Nor is the debate about whether such rules can be embedded in a neural network. Rather, it is about whether the connectionist framework allows rule insertion and rule extraction.

Apparently some of the panel members ended up pessimistic about the powers of artificial neural networks. "This debate once more points out the limitations of connectionism," wrote Roy. Sun noted that "clearly the death knell of strong connectionism has been sounded."

Noel Sharkey had a more realistic view, in my opinion. He was quoted as saying that there currently "seems little reason (or evidence) to even think about the idea of extracting rules from our neural synapses. Otherwise, why can we not extract our bicycle riding rules from our brain?"

New Functional Language for Common Lisp

Axel is a new functional language that compiles directly into Common Lisp code. It offers pattern-matching and the option to use static type checking when desired. Other features include: the ability to generate portable and type-secure Lisp from Axel source; the capacity to add to the type system of Axel by adding the types of new system functions from Lisp packages such as CLOS or CLIM; a type checker that localizes type errors down to parts of individual lines of code; and much more!

Axel 2000 currently runs under CLisp and Allegro Lite. It is free for non-commercial applications. For more details on how to download see spherum.com.

to sense nearby obstacles and walls.

On the other hand, if you wish, you can also purchase an assembled, or partially assembled PPRK at www.acroname.com/robotics/info/PPRK/PPRK.html for a reasonable price.

Over two million citations from 200,000 CS articles are now included in the demo version of ResearchIndex (formerly called CiteSeer). The site provides automatic citation indexing for a digital library of Postscript and PDF scientific papers, with active links for browsing the archive.

In addition, when papers aren't in the archive, it will automatically perform a search for them on the Web. Users can do similar-document full-text searches and can be notified of new documents of interest.

The citation graph analysis identifies authoritative and review articles. The source code is free for non-commercial use, and could be adapted for whole digital libraries.

This promises to be the "killer app" of Internet research. Find it at researchindex.com. Highly recommended!
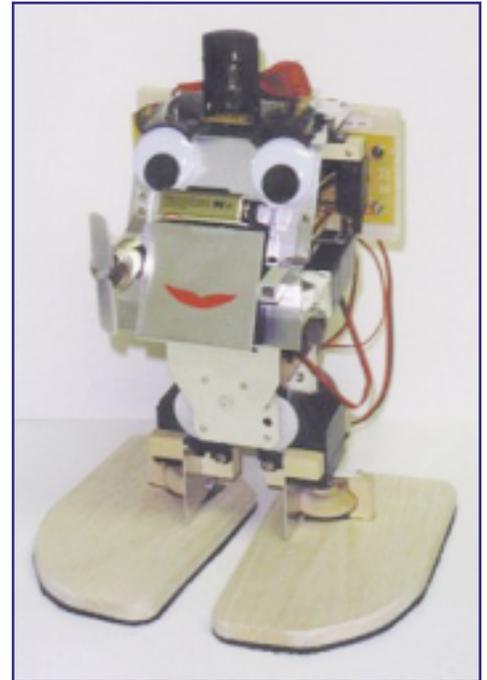

The Palm Pilot Robot Kit can be made cheaply and programmed easily. Building or ordering information can be found at www.acroname.com.

Trinity College Fire Fighting Contest

The rules for the 2001 Trinity College Fire Fighting Contest have now been posted at www.trincoll.edu/events/robot/. The goal of the 2001 contest is the same as previous years: to build a robot that can find and extinguish a fire in a "house." The challenge for the entrants is to build a computerized (not radio-controlled) robotic device that can move through a model of a single floor of a house, detect fire (a lit candle) and then put it out. Robots that consistently accomplish this task in the shortest time win.

The last contest was held in April, 2000. People came from all over the United States, Canada and the world to compete, participate, watch, learn and have fun. Contestants came from as far away as Switzerland, France, Argentina, South Korea, Israel, Palestine, and Australia. They claim that this is the "largest, public, truly autonomous robotics competition held in the United States that is open to entrants of any age, ability or experience from anywhere in the world." Their claim may be qualified, but the contest looks like a fun learning experience.

One of the more creative entrants last year was Mark Whitney's Mrs. Stampy. She is a walking bipedal firefighter. Although she doesn't run, she is twice as fast as her predecessor, Stampy. Mrs. Stampy actually met the six minute time limit of the 2000 contest, but still wasn't a serious competition for the rest of the wheeled robots. She came in 34th, which wasn't bad.

To see Mrs. Stampy, and the other Trinity Fire Fighting Robots, in action check out the contest video that is now available. The video contains 87 minutes of highlights of the 2000 contest plus some "interesting extras." The video is $25. Ordering information can be found at the Trinity Web site.

Mrs. Stamp is a walking fire fighting robot. She's not real fast, but she can put out the flames at the Trinity Fire Fighting Contest.

Rules and Nets

Sharkey also noted that "the relationship between symbolic rules and how they emerge from connectionist nets (or even whether or not they really exist) has never been resolved in connectionism." The whole idea of rule extraction from neural networks, and the complaints surrounding connectionism's inability to do it, seem to be completely misguided in my opinion.

To see this panel debate, and past ones, can be found at www.bbb.caltech.edu/compneuro/.

In any event, research into this area continues. A. Vahed and C.W. Omlin have just released a new paper entitled "Rule Extraction from Recurrent Neural Networks using a Symbolic Machine Learning Algorithm." It is available from www.cs.sun.ac.za/~omlin/papers/iconip_99.paper.ps.gz. The paper contains preliminary results and the authors welcome any comments.

In addition, a free software package based on the Discretized Interpretable Multi-Layer Perceptron (DIMLP) model is available for download from ftp://ftp.comp.nus.edu.sg/pub/rstaff/guido/. The package was created to extract rules from networks. The software is distributed free of charge for research purposes.

Pocket Scheme

Version 1.1.0 of Pocket Scheme is now available. This is the preferred Scheme programming environment for Hand held PC's, Pocket PC's, and Palm-sized PC's for many people. This release adds support for unlimited precision integer arithmetic, along with exact non-integer rational numbers. It also fixes some major bugs from previous versions. You'll find it at www.mazama.net/scheme/pscheme.htm.

Connectionist Development Kit

A new, free neural network software development kit for Microsoft's Windows 9x/NT is now available for research, education, and evaluation purposes. The Dendronic Learning Engine fits data by breaking hyperplanes such that corners and edges are smoothed by quadratic fillets. The software illustrates bagging, reinforcement learning (both value iteration and Q-learning), and the modeling of 3-D space using a smoothed, piecewise linear occupancy function. The software allows the architecture of networks to grow automatically. This should be a useful tool for graduate student projects, as well as for university and industrial researchers. To find out more, see their webpage at www.dendronic.com.

IN BRIEF

Jerry Iglowitz has announced a web page dealing with the mind-brain problem from the perspective of evolutionary biology. He sees brains as co-ordinators of the underlying meta-cellular responses of their organisms. See his "Virtual Reality: Consciousness Really Explained," at www.foothill.net/~jerryi/.

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The Cognitive Science Web is a community Web site for people interested in Cognitive Science and related disciplines. New forums are welcome. See www.cognitivescience.org.

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The journal "Trends in Cognitive Sciences" covers psychology, AI, linguistics, philosophy, computer science, anthropology, physiology, and neuroscience. See www.elsevier.com/inca/publications/store/6/0/0/3/5/6/.

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"Always Think About It" is a listserve focusing on puzzles and problem-solving techniques. Email: thinkaboutit-subscribe@topica.com to join.

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The comp.ai.games FAQ has moved to www.geocities.com/cagfaq, and is now maintained by David Burbage.

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ChessLab is an online chess tutor with a database of 2 million games. See www.chesslab.com/PositionSearch.html.

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The ICCA/ICGA Journal is a quarterly publication of the International Computer-Chess Association, including peer-reviewed scientific articles. See www.dcs.qmw.ac.uk/~icca/, or see the database of abstracts at supertech.lcs.mit.edu/~heinz/iccaj_db/.

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Carver Mead's microchip company, Foveon in Santa Clara, CA, has developed a CMOS image-sensing chip with 70 million transistors and about twice the linear resolution of 35mm film. It's 4,096 x 4,096 pixels per square inch (16.8 megapixels) and matches a recently announced Kodak CCD chip, but the process is apparently so cheap that consumer video cameras could sell for less than $100. This could create an environment of ubiquitous vision.

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Iowa State University has a new 3-D virtual reality theater where visitors can interact with scenes projected on the walls, floor, and ceiling. Special goggles allow the system to track head position. One demo is a virtual tornado that can be examined from all sides.

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Distributed Virtual Environments (DVEs) are discussed in an IEEE Spectrum article at www.OpenCommunity. com/spectrum/index.html.

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The new iFeel MouseMan from Logitech includes a motor that lets users "touch" and "feel" bumps and textures on their computer screens (where programmers have encoded them). The experience is partly customizable, such as setting icons to feel metallic or rubbery.

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Lucent's new wavelet-based Digital Geometry Compression for 3-D objects is said to be 12 times more efficient than MPEG4 and six times more efficient than the best previously published method. For more information, see www.lucent.com/press /0700/000726.bla.html.

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Open Mind Commonsense is a new Web site for collecting "commonsense" knowledge, eventually to include stories, diagrams, emotional impressions, problem-solving episodes, and other forms of mental representation. The database can be downloaded for free. Contributed knowledge bits are solicited at openmind.media.mit.edu, which will soon move to www.openmind.org.

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Jorn Barger has created a link page for material about Cyc, Doug Lenat, Guha, etc., at www.robotwisdom.com/ai/cycresources.html.

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AI Hype Watch: LANL robotics physicist Mark Tilden and a private company are hoping to put two autonomous biomorphic robots on the Moon in 2004 as a media event and to collect lunar pebbles for sale on Earth. Such robots might groom a section of the Moon for future robotic and human colonists. Tilden also hopes to sell his survival-driven biomorphic robots (and analog machines) as toys and tools for Earth use. See www.space.com/missionlaunches/missions/moon_doggies_000918.html.

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Robotica Ltd. (Glasgow) designs and manufactures modular robotics and motion control products for education and entertainment. For instance, they can convert a radio-controlled car into a PC-controlled programmable mobile robot. Visit www.robotica.co.uk, or sign up for their mailing list at www.robotica.co.uk/contact/mailing_list.htm.

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International Submarine Engineering builds remotely operated and autonomous robots and underwater vehicles, for military, scientific, and commercial markets. See www.ise.bc.ca.

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BOTindex is a new, searchable robot database where robot builders can show off their creations. You can register your own entries at www.no2.dk/mbot/botindex.

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Links to Java AI code and robotics resources can be found at www.geocities.com/Athens/Agora/7256/java.html and www.geocities.com/mentifex/motorium.html. These might be useful for student projects.

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New services to detect plagiarism by comparing a student's writing to past work by the same student are offered by companies such as Information Analytics, Glatt Plagiarism Services, and IntegriGuard. Plagiarism.org (from IParadigms, founded by two former UCB professors) compares a student's work with 125,000 research papers and with Web material.

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All of the free language translation services on the Web are listed at Translate-Free.com.

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You can sign up for the Machine Learning email list at www.egroups.com/group/machine-learning.

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Nine models of the S&P 500 financial time series are maintained at a neural prediction Web site, just recently made free to all. You'll find the data at www.financialtimingmodels.com.

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The Second Moment Web site and forum for applied statistics and analytics featured an interview with Dr. Halbert White, UCSD Economics, on neural networks. See www.secondmoment.org.

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Worldwide damages from the Love Bug virus have been estimated at up to ten billion dollars, but charges against the suspects have been dropped. Apparently, their actions were not illegal at the time and place of their occurrence.

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Computists International is a great, free AI news service and continues to provide the main source of the AI News Briefs. You'll find this service at www.egroups.com/group/CI-Freebies. It can be delivered directly to your mailbox weekly.

Do you have an item that you think is suitable for the News section in *intelligence*? We'd like to hear from you. Please send your item to *d.blank@csce.uark.edu*.