The Last Class

- Wrap up
- The future of AI
- A future in AI
- AI in the future

AI

You don't have to be a space traveler or a Science Fiction reader to see the need for AI.

(But the latter helps!)

We are surrounded by them!

" I have always wished that my computer would be as easy to use as my telephone. My wish has come true. I no longer know how to use my telephone."

Bjarne Stroustrop (originator of C++)

Read on ...

" I have a feature-packed telephone with 43 buttons, at least 20 of which I am afraid to touch. This phone probably can communicate with the dead, but I don't know how to operate it, just as I don't know how to operate my TV, which has features out the wazooty and requires THREE remote controls …"

from humorist Dave Barry's column

I took these quotes from

A paper titled "A Reliable Natural Language Interface to Household Appliances,"

by Alexander Yates, Oren Etzioni, and Daniel Weld, all from the University of Washington.

The paper appeared in the proceedings of the 2003 International Conference on Intelligent User Interfaces.

It is a conference sponsored by

ACM SIGART: Special Interest Group on Artificial Intelligence, and

ACM SIGCHI: Special Interest Group on Computer-Human Interaction

The Computational Complexity of Air Travel Planning

At any moment: 2,000 - 10,000 commercial airliners in the sky.

Part of a dense network that provides more than 100,000 practical paths from Boston to San Francisco every day.

Search problem: finding a desirable combination of flights and fares for a given passenger's trip.

Much harder than path planning.

The complexity

- The airlines' price structure is so rich that finding the cheapest price for a simple round-trip journey is in the general case undecidable.
- Even if one bounds the size of solutions to a small number of flights there may be more than 10^{20} reasonable answers to a simple travel query.
- New search algorithms that are a radical departure from the brute force methods that are being used. For example, the use of graphical representations similar to a Bayes' net, a graph of 250,000 nodes can encode 10^{30} or more travel options.

I took this information from

The abstract of a talk given by Carl de Marcken, Chief Scientist and co-founder of ITA software, a company that provides the search engine behind Orbitz and various airline web sites.

The talk was at CMU on February 11, 2003.

Smart cars

The U.S., Department of Transportation, through the 1998 Intelligent Vehicle Initiative, identified 8 areas where intelligent systems could "improve" or "impact" safety.

Smart cars (cont'd)

- **Four kinds of collision avoidances**
  - **rear end**
  - **lane change and merge**
  - **road departure**
  - **intersection**
- **Two kinds of enhancements**
  - **vision**
  - **vehicle stability**
- **Two kinds of monitoring**
  - **driver condition**
  - **driver distraction**

Smart cars (cont'd)

Also, avoiding excessive braking can eliminate traffic jams together. Simulations showed that motorists tend to overcompensate for slowing traffic ahead.

These and more now at high-end cars such as Mercedes-Benz, BMW, and Jaguar. Tomorrow at cheaper cars, minivans, SUVs.

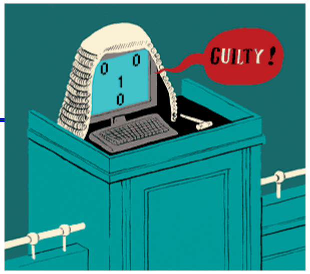
These are from the ME Magazine.

www.memagazine.org/backissues/mar03/features/smartcar/smartcar.html

Robots playing soccer

First robocup in 1997.

AI in law



What is arguably one of the most conservative of all professions has already been quietly undergoing a technological revolution: many lawyers now use automated document-retrieval systems to store, sort and search through mountains of documents. But the introduction of smarter programs, capable of not just assisting lawyers but actually performing some of their functions, could turn the profession on its head. Such software could both improve access to justice and massively reduce legal costs, both for the client and the courts.

That is not to say that laptops will soon be representing people in court…

Economist.com March 10, 2005

DARPA Grand Challenge 2004

A race of autonomous ground vehicles from the vicinity of Los Angeles to Las Vegas in 2004.

The purpose of the DARPA Grand Challenge 2004 is to leverage American ingenuity to accelerate the development of autonomous vehicle technologies that can be applied to military requirements. No team entry successfully completed the designated route for the DARPA Grand Challenge 2004.

The race course

Grand Challenge 2004

Grand Challenge 2004

DARPA Grand Challenge 2005

5 teams finished. Stanford Racing Team was the winner.

http://www.grandchallenge.org/index.html

http://www.stanfordracing.org

AI: past and future (Knowledge Management World, April 2003)

- Department of Commerce's assessment of the AI market from 10 years ago included a definition of AI. AI included systems that could
  - help organizations manage knowledge assets and deal with complexity
  - help experts solve difficult analysis problems and design new devices
  - learn from examples
  - provide answers to English questions using both structured data and free text
- 1993 estimate of the global AI market (incl. Expert systems, neural networks, fuzzy logic, robotics, speech recognition, search, etc) was around $900 million. US ahead in most fields.

AI: past and future (cont'd)

- Funding from the government, DOD. Deployed in Desert Storm.
- Commercial side: between 70% and 80% of the Fortune 500 used AI in some way, primarily in manufacturing, data management, transportation, diagnostics and financial services
- 2002 market: 11.9 billion, predicted to reach $21 billion in 2007.
- Target AI technologies: expert systems, belief networks, decision support systems, neural networks and agents. Fastest growing ones are belief networks, neural networks and expert systems.

AI: past and future (cont'd)

- AI-enhanced applications: finance, defense/domestic security, education.
- AI is a term that has been mythologized in today's culture. One has to emphasize that AI used in conjunction with existing applications and larger systems can intrinsically enhance both the application and the system.

AI enhanced applications

- Lie-detection: watching for micro-gestures, blushing, changes in the shape of the eye, and head and shoulder movement as opposed to polygraph tests for lie-detection.
- Health supplement direct marketer Media Power Inc. doubled the conversion rate on its upsells by implementing a 'virtual agent' automated system designed to respond to consumer inquiries like a human. Combines AI and voice recognition to create a human-like automated agent at one-tenth the cost of live agents.

Need I say more?

OK, one more

How about AI to assist mothers?

An AI baby bed!

Designed to play parents' voices beforehand and swing itself in an automatic response to the crying sounds of a baby. It also sets off an alarm when the baby happens to slip outside its baby bed.

A small student club called "I-new" of Seoul National University of Technology (SNUT) surprised the baby goods industry by winning the silver medal at the first national student invention contest.

The topics we covered

- AI: History and Applications
- The Predicate Calculus
- Automated Reasoning (Resolution Refutation)
- Structures and Strategies for State Space Search (BFS, DFS)
- Heuristic Search (best-first, A*)
- Control and Implementation of State Space Search
- Knowledge Representation
- Strong Method Problem Solving (Expert Systems, Planners)
- Reasoning in Uncertain Situations (with and without probabilities)
- Machine Learning: Symbolic (VS, DT, EBL, Analogy, Clustering, Reinforcement)
- Machine Learning: Connectionist (perceptrons)
- Understanding Natural Language (Transition Network Parsers)