The Intelligent Computer
—
Winston, Chapter 1

Michael Eisenberg and Gerhard Fischer
TA: Ann Eisenberg

AI Course, Fall 1997

Artificial Intelligence

- **engineering goal:** to solve real-world problems using AI techniques and methods about
  - representing knowledge
  - using knowledge
  - assembling systems

- **scientific goal:** to determine which ideas about
  - representing knowledge
  - using knowledge
  - assembling systems

  explain various sorts of intelligence

AI — Global Assessments

- **Feigenbaum / McCorduck:** *"Most knowledge-based systems are intended to be of assistance to human endeavor; they are almost never intended to be autonomous agents. A human-machine interaction subsystem is therefore a necessity."*

- **Stefik**: *"The most widely understood goal of Artificial Intelligence is to understand and build autonomous, intelligent, thinking machines. A perhaps larger opportunity and complementary goal is to understand and build an interactive knowledge medium."*

Winston's Book — Three Parts

Part 1: Basic Representations and Methods

- semantic nets
- weak methods: generate and test, means-end analysis
- search (basic, optimal, adversarial)
- rules and rule chaining
- frames and inheritance
- frames and common sense
- logic

Part 2: Learning Methods

- analyzing differences
- explaining examples
- recording cases
- training neural nets

Part 3: Visual Perception and Language Understanding

- recognizing objects
- describing images
- expressing language constraints

Special Lectures

- AI and Design
- AI and Education
- AI and Creativity
- Artificial Life
- AI and the WWW

What AI Can DO

- intelligent systems can help experts to solve difficult analysis problems
- intelligent systems can help experts to design new devices
- intelligent systems can learn from example
- intelligent systems can provide answers to English questions using both structured data and free text
- intelligent systems can assist in data mining and knowledge discovery in databases
- intelligent systems can support vehicle control systems (route planning, obstacle avoidance, position estimation)

Example: Knowledge Discovery in Databases (KDD)

- sources:
  - U. Fayyad, G. Piatetsky-Shapiro, and P. Smyth: “From Data Mining to Knowledge Discovery in Databases”, AI Magazine, Fall 96, Vol 17, No. 3, pp 37-54
  - Special Issues of the Communications of the ACM (CACM), Nov 96, Vol 39, No 11 on “Data Mining”

- basic problem addressed: mapping low-level data into other forms that may be more
  - compact (a short report)
  - more abstract (a descriptive report)
  - more useful

- data mining is a particular step in the KDD process: the application of specific algorithms for extracting patterns from data

- traditional method of turning data into “knowledge”: manual analysis and intepretation

Examples of KDD Systems

- ADVANCED SCOUT: a specialized data mining system that helps the NBA coaches organize and interpret data from NBA games

- NEWSHOUND (http://sjmercury.com.hound/) and FARCAST (http://farcast.com): automatically search information from a wide variety of sources, including newspapers and wire services, and e-mail relevant documents directly relevant to the user

- intelligent agents for the World-Wide Web

AI as a ubiquitous (or loosing) Discipline: Examples

Winston: AI is becoming less conspicuous, yet more essential

- symbolic integration: from Slagle's program ---> Macsyma ---> Mathematica
- dynamic memory structures: from IPL-V ---> LISP ---> C ---> Java
- memory structures ---> frames ---> object-oriented approaches ---> abstract data types
- production systems ---> rule-based systems ---> OPS-5
- nearly decomposable systems ---> closed subroutine, layers of abstraction
- powerful programming environments for exploratory programming: from Interlisp ---> personal workstations ---> graphical user interfaces ---> .....

AI versus IA

- computer-supported cooperative work
- collaborative systems
- distributed AI

AI versus IA — Example: Cockpit Design