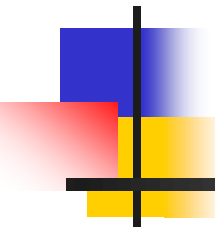


Part 1: Introduction

- Intelligence
- Defining A.I
- History
- Turing Test
- A.I Applications
- Multi-disciplinary domain

Intelligence

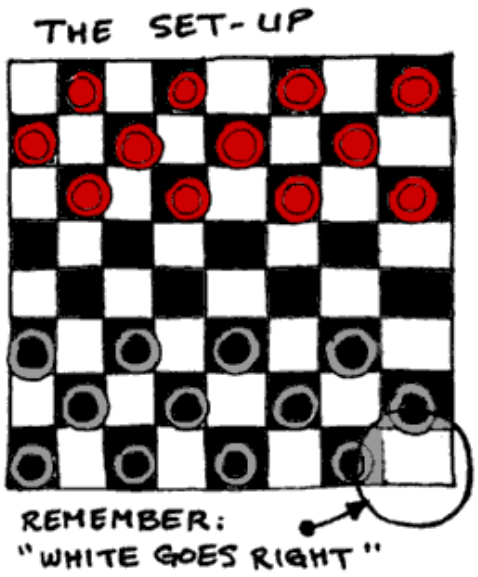
- **Dictionary definition;**

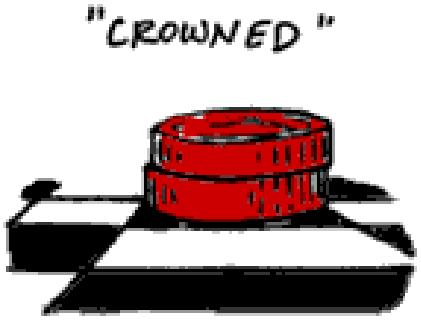
(1) **:** the ability to learn or understand or to deal with new or trying situations **:** **REASON**; *also* **:** the skilled use of reason

(2)**:**the ability to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria (as tests)

-Merriam-Webster's Collegiate Dictionary

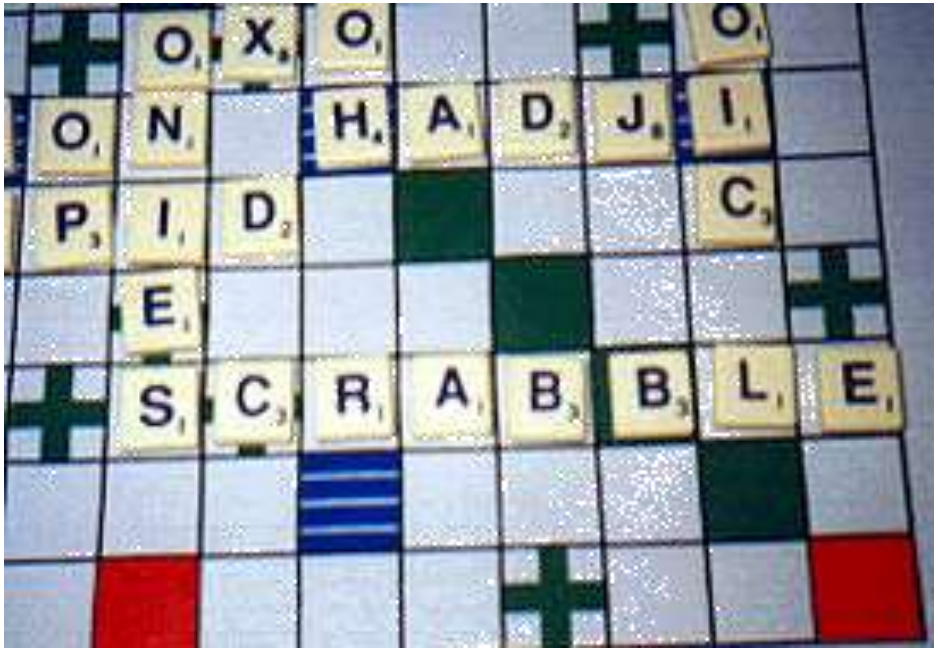
Playing games:Draughts





Is a computer more intelligent
if it beats you in a game of draughts?

Playing games:Scrabble



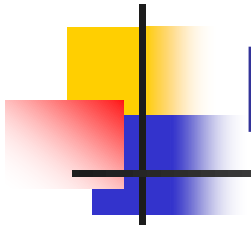
Is a computer more intelligent
if it beats you in a game of scrabble?

Intelligence

- Types of intelligence (Multiple intelligence theory, Howard Gardner)
  - Linguistic-verbal intelligence
  - Logical-Mathematical intelligence
  - Musical intelligence
  - Spatial intelligence
  - Intrapersonal intelligence
  - Interpersonal intelligence
  - Naturalist intelligence
  - Bodily-Kinesthetic intelligence

Theoretical foundations for recognizing different talents and abilities in people

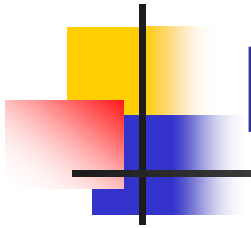
- "What makes life interesting, however, is that we don't have the same strength in each intelligence area, and we don't have the same amalgam of intelligences. Just as we look different from one another and have different kinds of personalities, we also have different kinds of minds."



Defining A.I

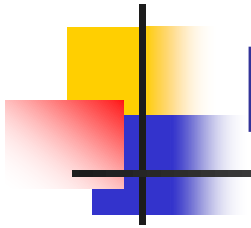
There is no agreed definition of the term artificial intelligence. However, there are various definitions that have been proposed. These are considered below:

- AI is a study in which computer systems are made that think like human beings. Haugeland, 1985 & Bellman, 1978.
- AI is a study in which computer systems are made that act like people. AI is the art of creating computers that perform functions that require intelligence when performed by people. Kurzweil, 1990.
- AI is the study of how to make computers do things which at the moment people are better at. Rich & Knight
- AI is a study in which computers that rationally think are made. Charniac & McDermott, 1985.



Defining A.I

- AI is the study of computations that make it possible to perceive, reason and act. Winston, 1992
- AI is the study in which systems that rationally act are made. AI is considered to be a study that seeks to explain and emulate intelligent behaviour in terms of computational processes. Schalkeoff, 1990.
- AI is considered to be a branch of computer science that is concerned with the automation of intelligent behavior. Luger & Stubblefield, 1993.
- ...

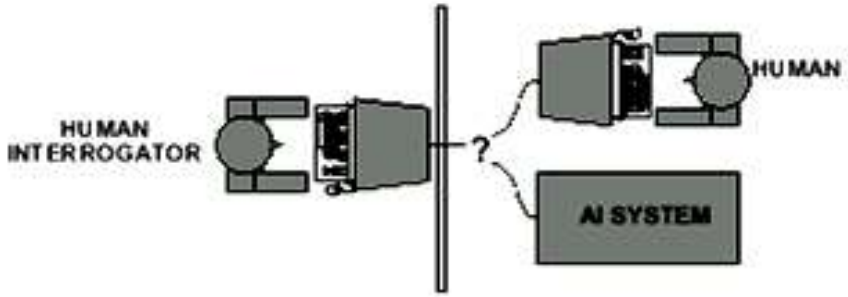


History

- 1943 McCulloch & Pitts: Boolean circuit model of brain
- 1950 Turing's "Computing Machinery and Intelligence"
- 1950s Early AI programs, including Samuel's checkers (draughts) program
- Newell & Simon's Logic Theorist, Gelernter's Geometry Engine
- 1956 Dartmouth meeting: "Artificial Intelligence" adopted
- 1966–74 AI discovers computational complexity,
  Neural network research almost disappears
- 1969–79 Early development of knowledge-based systems
- 1980–88 Expert systems industry booms
- 1988–93 Expert systems industry busts: "AI Winter"
- 1985–95 Neural networks return to popularity
- 1988– Resurgence of probabilistic and decision-theoretic methods
  Rapid increase in technical depth of mainstream AI,
  "Nouvelle AI": ALife, GAs, soft computing

Acting Humanly: Turing Test

- Alan Turing's 1950 article *Computing Machinery and Intelligence* discussed conditions for considering a machine to be intelligent
  - "Can machines think?" ←→ "Can machines behave intelligently?"
  - The Turing test (The Imitation Game): Operational definition of intelligence.



- **Computer needs to posses:** Natural language processing, Knowledge representation, Automated reasoning, and Machine learning
- **Problem:** 1) Turing test is not reproducible, constructive, and amenable to mathematic analysis. 2) What about physical interaction with interrogator and environment?
- Total Turing Test: Requires physical interaction and needs perception and actuation.

A.I applications

- ALVINN
- MYCIN, PROSPECTOR,..
- Deep Blue
- Data Mining
- ...

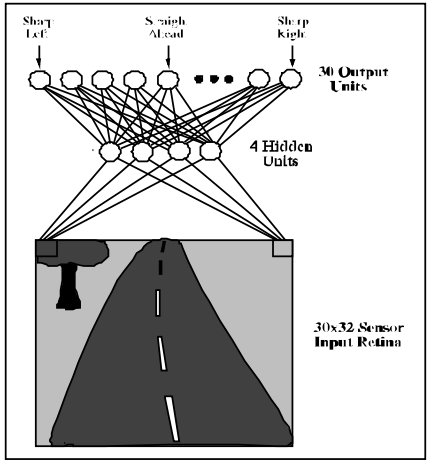
ALVINN

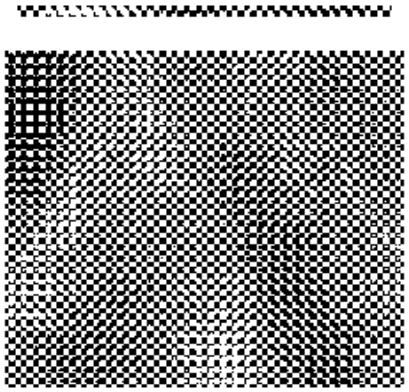
ALVINN drives 70 mph on highways

30 outputs for steering

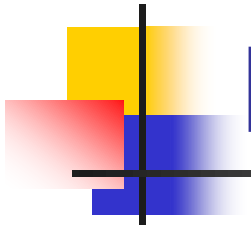
4 hidden units

30x32 pixels as inputs





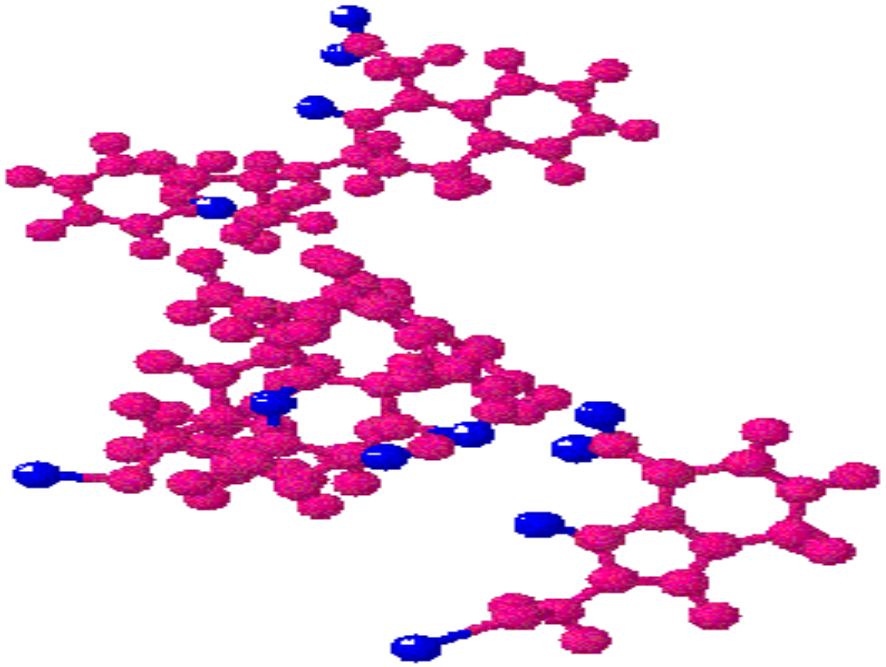
30x32 weights into one out of four hidden unit



Knowledge-based systems

- Medical Diagnosis - MYCIN
  - 1971, A program that could diagnose blood infections. It had 450 rules
- Mineral Prospecting - PROSPECTOR
  - 1979, A program that dealt with geological data. It recommended exploratory drilling sites that proved to have substantial molybdenum deposits.

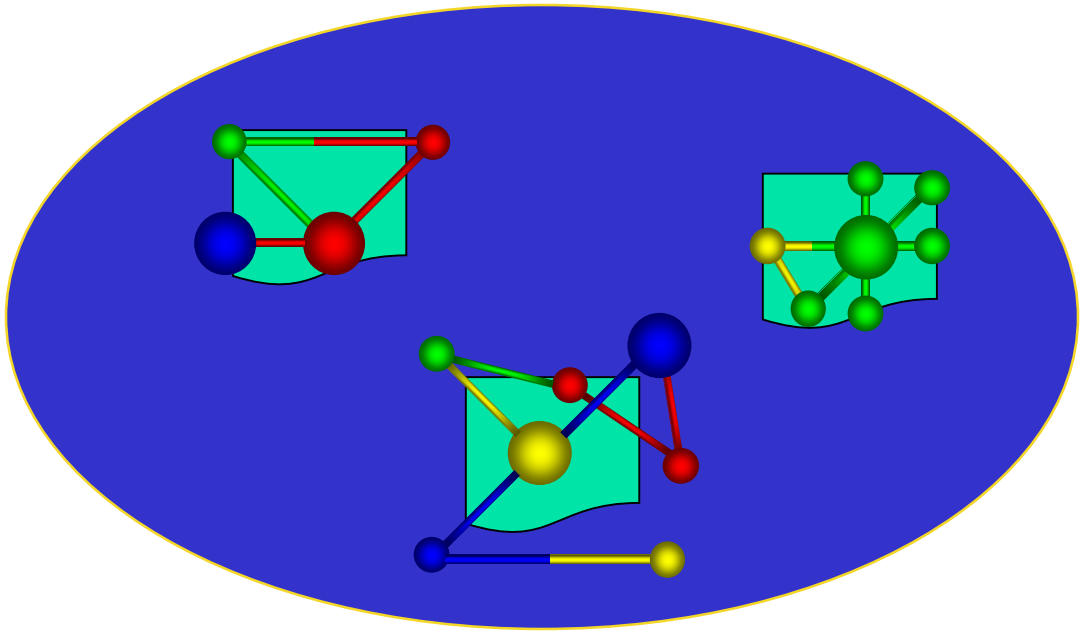
Data Mining



- Which characteristics in the 3-dimensional structure of new molecules indicate that they may cause cancer ?

Data Mining

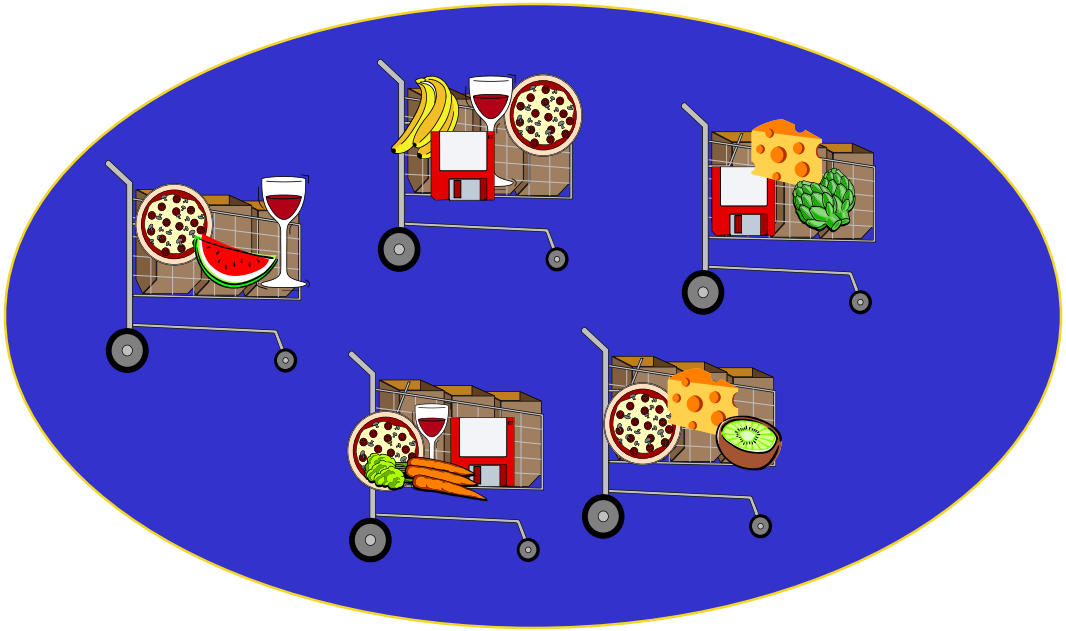
- An application of Machine Learning techniques
  - It solves problems that humans can not solve, because the data involved is too large, noisy ...



Detecting cancer risk molecules is one example.

Data Mining

- A similar application:
  - In marketing products ...



- Fraud Detection
  - Credit card fraud detection

Predicting customer behavior in supermarkets is another.

Branches of A.I

- Machine vision
- Speech synthesis and recognition
- Machine Learning
- Robotics
- Natural Language and understanding
- Problem solving
- Game playing
- ..

Applications

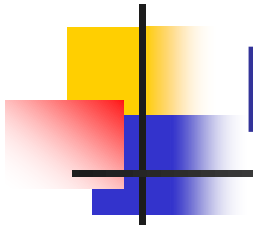
- Computer vision
- Image Recognition

- Language and speech processing

- Robotics

AI, a Multi-disciplinary domain

- Engineering:
  - robotics, vision, control-expert systems, biometrics,
- Computer Science:
  - AI-languages , knowledge representation, algorithms, …
- Pure Sciences:
  - statistics approaches, neural nets, fuzzy logic, …
- Linguistics:
  - computational linguistics, phonetics in speech, …
- Psychology:
  - cognitive models, knowledge-extraction from experts, …
- Medicine:
  - human neural models, neuro-science,...



END…..

- Questions??
- Comments??
- Suggestions??