What is Artificial Intelligence (AI)?

AI in Society

Relating with AI
What is Artificial Intelligence (AI)?

Artificial Intelligence (Merriam-Webster):
1. a branch of computer science dealing with the simulation of intelligent behavior by computers.
2. the capability of a machine to imitate intelligent human behavior.

- Two flavors of AI:
  - **Strong AI**: Design computer systems that demonstrate full human-level intelligence using “same” mechanisms.
  - **Weak AI**: Design computer systems that demonstrate human-like abilities using any mechanisms.
Artificial Intelligence: Beginnings

- Town Clock (Munich; 1500s)
- Mechanical Duck (1739)
- Mechanical Turk (1770)

- First AI artifacts are mechanical automata which simulate various intelligent processes, *e.g.*, movement, reasoning.
Artificial Intelligence: The 1940s

Warren McCulloch and Water Pitts

Norbert Wiener
(1894–1964)

- Initial focus on natural models of neural (McCulloch-Pitts) and homeostatic (Wiener) processes.
Artificial Intelligence: The 1950s

- AI born at Dartmouth Conference in 1956 (McCarthy).
- Focus shifts to abstract information-processing models (e.g., General Problem Solver (GPS) (Newell-Simon)).

John McCarthy (1927–2011)

Artificial Intelligence: The 1960s

- Information-processing-based AI systems proliferate (e.g., ELIZA (Weizenbaum)); first rule-based expert system created (e.g., MYCIN); first-generation neural network research killed off by Minsky and Papert.

Joe Weizenbaum (1923–2008)

Marvin Minsky and Seymour Papert (1927–2016 / 1928–)
The LOGO Turtle (1969)
Artificial Intelligence: The 1960s (Cont’d)

Shakey (1969)
Artificial Intelligence: The 1970s

- Retreat to “toy” micro-world systems (e.g., SHRDLU); emergence of AI critics into popular culture (What Computers Can’t Do (1972) (Dreyfus); Computer Power and Human Reason (1976) (Weizenbaum)).
Artificial Intelligence: The 1980s

Rodney Brooks (1954–)

Genghis (1989)

- Second-generation neural network research begins; rise of reactive systems (e.g., Genghis (Brooks)); massive governmental (Fifth Generation Project (MITI: Japan) / Strategic Computing Initiative (DARPA: USA)) and industrial start-up funding
- Over-selling leads to crash and late 1980s “AI Winter”.
Artificial Intelligence: The 1990s

Gary Kasparov vs. IBM's Deep Blue (1997)
Artificial Intelligence: The State of the Art

- Three types of techniques:
  1. Search-based: GPS, Theorem Proving
  3. World-based: Reactive Robotics, Machine Learning

- Original goal in 1956 was Strong AI, which is very hard; is now usually Weak AI in which heuristics (e.g., Google search) and/or brute-force processing (e.g., IBM’s Watson) are used to get human-level speed if not accuracy.

- Notable successes wrt particular domains, e.g., natural language processing, autonomous vehicles.
Artificial Intelligence: The State of the Art (Cont’d)

IBM’s Watson wins Jeopardy (2011)
Google’s self-driving car (2016)
The Joys of Artificial Intelligence

- Easier / more natural interaction with computers on focused topics (e.g., psychological / medical advice).
- Replacement of humans with computers in physically demanding / dangerous / non-rewarding situations (e.g., battlefield, child / elder care).
- Long-overdue re-assessment of the nature of humanity.
The Perils of Artificial Intelligence

- Psychological or physical trauma from assumption of intelligence and/or understanding where none is present (e.g., chatbots, battlefield robots).
- Lowering of human standards for treatment of other humans (e.g., child / elder care)
Case Study: ELIZA and Other Chatbots

- Created by Joe Weizenbaum in the mid-1960’s as a simulation of a Rogerian psychotherapist.
- Simulates intelligent conversation using pattern-matching and response frames (same mechanisms used by modern chatbots).
- Many human beings trust and confide in ELIZA, even when they know ELIZA does not and cannot understand them or their problems.
- Similar confusion when dealing with modern chatbots, e.g., falling in love with a chatbot (Epstein (2007)).
Case Study: ELIZA and Other Chatbots (Cont’d)

Talk to Eliza

> Hello, I am Eliza.
* I have many problems.
> Don't you ever say Hello?
* No. That's one of my problems. Rudeness.
> You are being a bit negative.
* Yes, I'm very negative most of the time. It runs in my family.
> Did you come to me because you are very negative most of the time. It runs in your family?
* I'm amazed by your insight. Yes, that's it. You're amazing.
> Perhaps you would like to be amazing?

Input: |
Surviving and Thriving with Artificial Intelligence

- Know actual (and do not over- or under-estimate) capabilities of AI systems.
- Beware of exaggerated claims of AI system abilities.
- Until AI systems are actually sentient and capable of being responsible for their actions, assign responsibility to the creators of these systems, not the systems themselves.
- Do not over- or under-estimate the abilities or value of human beings – we may only be mechanisms, but we are beautiful and powerful mechanisms worthy of respect.

“Don’t Panic” – The Hitchhiker’s Guide to the Galaxy
“Let’s be careful out there” – Hill Street Blues