

CMSC 471

Intro to AI

Lecture 1:
What is AI?

What is AI?

Q. What is artificial intelligence?

A. It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

<http://www-formal.stanford.edu/jmc/whatisai/>

Ok, so what is intelligence?

Q. Yes, but what is intelligence?

A. Intelligence is the computational part of the ability to **achieve goals** in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines.

<http://www-formal.stanford.edu/jmc/whatisai/>

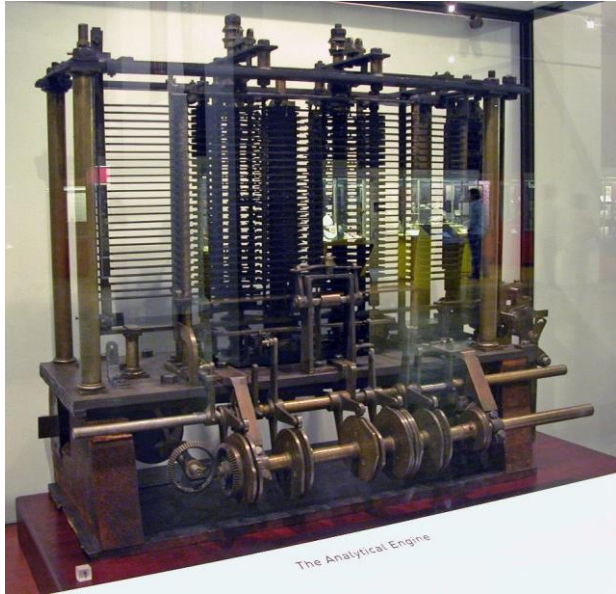
Every AI must
mention the
1956 Dartmouth
Conference...

1956 Dartmouth AI Project

“We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.”

<http://www-formal.stanford.edu/jmc/history/dartmouth/dartmouth.html>

...but don't
think AI
started
there...



[Analytical Engine - Wikipedia](#)



[Ada Lovelace Day Honors "the First Computer Programmer" - Scientific American Blog Network](#)

"The Analytical Engine has no pretensions whatever to *originate* anything. It can do *whatever we know how to order it* to perform. It can follow analysis; but it has no power of anticipating any analytical relations or truths."

AI prehistory and early years

- George Boole invented **propositional logic** (1847)
- Karel Capek coined term **robot** in play R.U.R. (1921)
- John von Neumann: **minimax** (1928)
- Norbert Wiener founded field of **cybernetics** (1940s)
- **Neural networks** (40s & 50s) among the earliest theories of how we might reproduce intelligence
- Isaac Asimov *I, Robot* (1950) Laws of Robotics
- **Turing test** proposed in 1950 & debated ever since
- Early work on **Chess** by Alan Turing, 1950

How popular is AI?

- AI has had it's ups and downs
 - 50-60 up, 70s down, 80s up, 90s down, 00s up, 10s up, 20s up, ...
- Hot topics today?
 - Neural networks again: deep learning
 - Machine learning, datamining
 - Exploiting big data
 - Autonomous vehicles, robotics
 - Text mining, natural language technology, speech
 - Computer vision

Why AI?

Engineering: get machines to do useful things

e.g., understand spoken natural language, recognize individual people in visual scenes, find the best travel plan for your vacation, ...

Cognitive Science: model and understand how natural minds and mental phenomena work

e.g., visual perception, memory, learning, language, decision making, ...

Philosophy: explore basic, interesting and important philosophical questions

e.g., mind-body problem, what's consciousness, free will, ...

What can AI systems do?

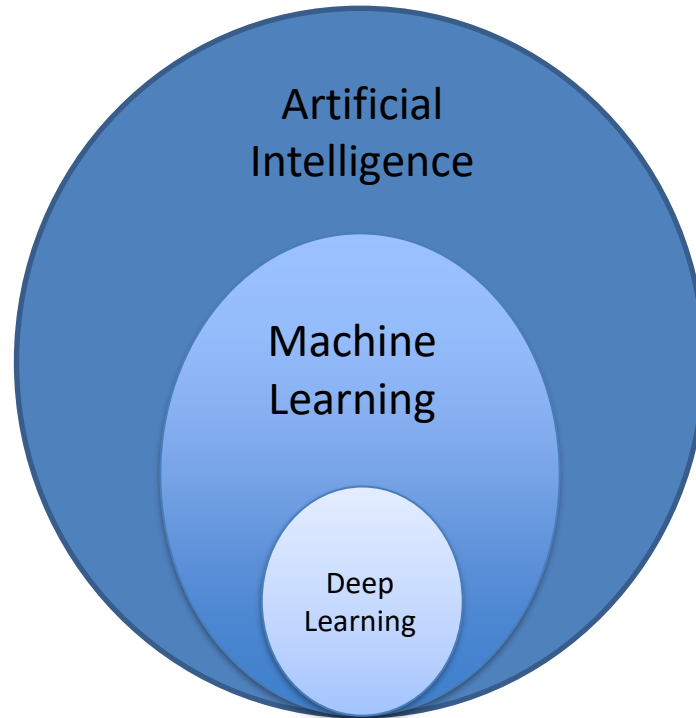
- **Computer vision:** face recognition from a large set
- **Robotics:** autonomous (mostly) automobile
- **Natural language processing:** useful machine translation and simple fact extraction
- **Expert systems:** medical diagnosis in narrow domains
- **Spoken language systems:** e.g., Google Now, Siri, Cortana
- **Planning and scheduling:** Hubble Telescope experiments
- **Learning:** text categorization into ~1000 topics
- **User modeling:** Bayesian reasoning in Windows help (the infamous paper clip...)
- **Games:** Grand Master level in chess (world champion), checkers,...

What can't AI systems do yet?

- Understand natural language robustly (e.g., read and understand articles in a newspaper)
- Surf the web and find interesting knowledge
- Interpret an arbitrary visual scene
- Learn a natural language
- Construct plans in dynamic real-time domains
- Refocus attention in complex environments
- Perform life-long learning

Exhibit true autonomy and intelligence!

AI Vs Machine Learning



Course Goals

Be introduced to some of the core problems and solutions of AI (big picture)

Learn different ways that success and progress can be measured in AI

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Implement AI programs