History of AI

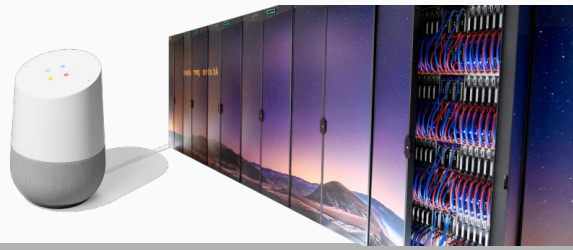
Let’s begin with simple questions

What is Artificial Intelligence (AI) ?

When was it invented ?

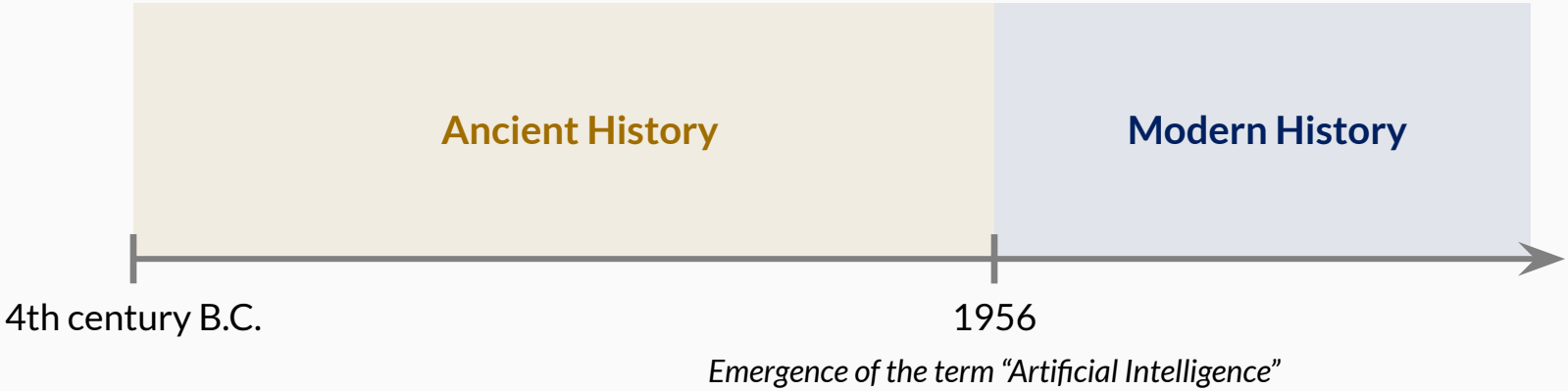
Who invented it ?

Where/How/Why was it created ?



A brief history of AI: from Aristotle's logic to "intelligent" machines

Based on AITopics website, powered by AAAI, one of the most important scientific societies in AI



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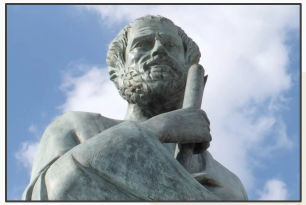

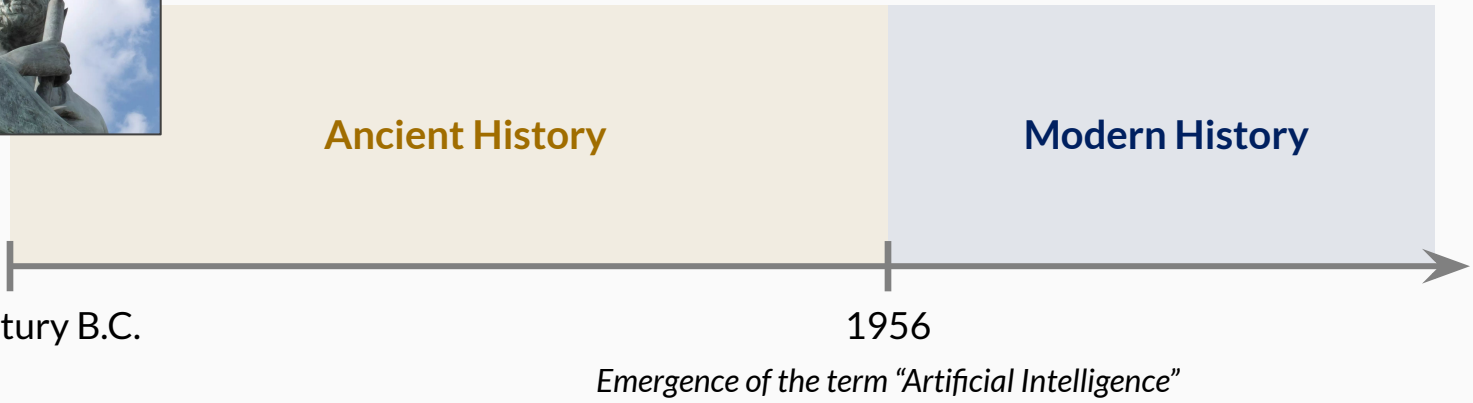

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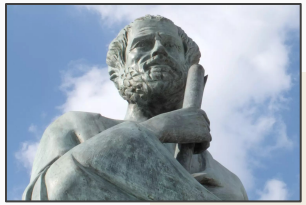

Ancient History

Modern History

4th century B.C.

1956

Emergence of the term "Artificial Intelligence"

Association for the Advancement of Artificial Intelligence

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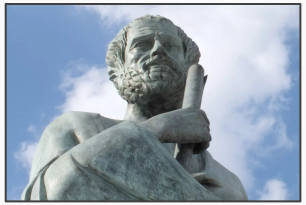

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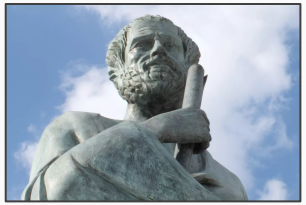

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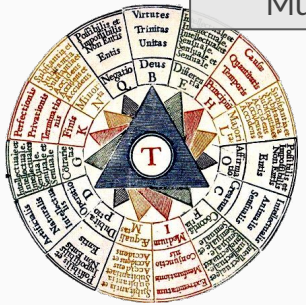

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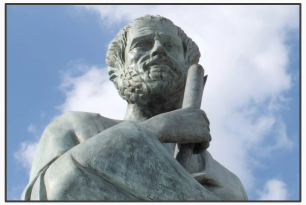

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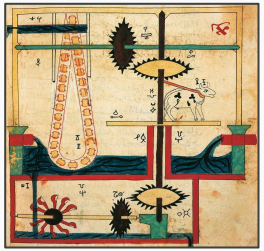

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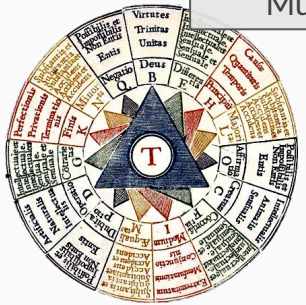

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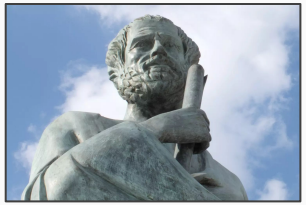

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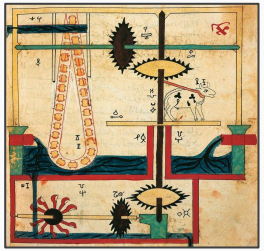

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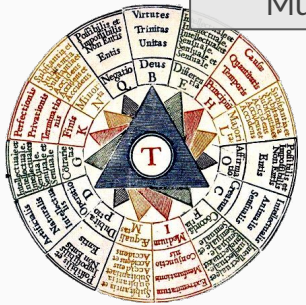

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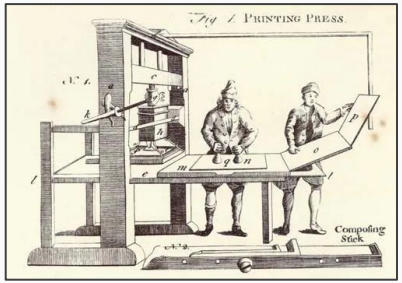
Gutenberg invented the movable-type printing press



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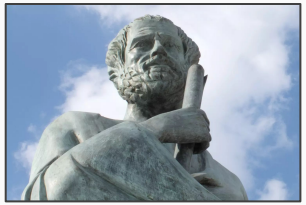

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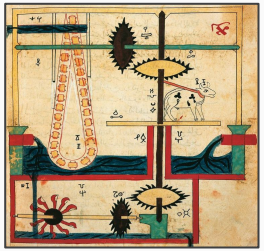

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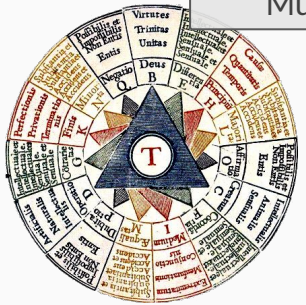

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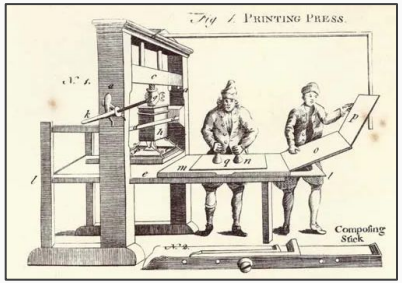

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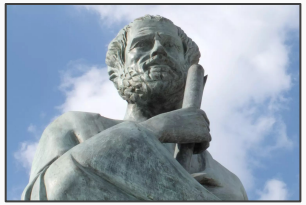

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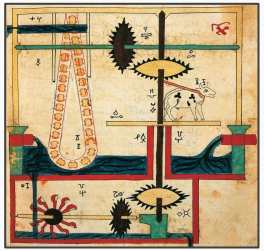

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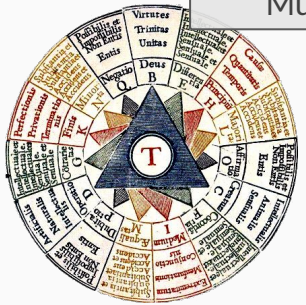

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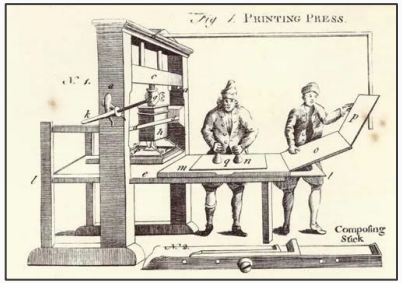

16th century

Clockmakers extended their craft to creating mechanical animals and other novelties

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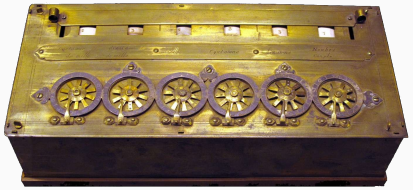
17th century

Pascal created the first mechanical digital calculating machine



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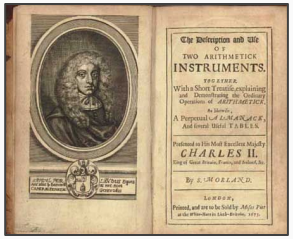

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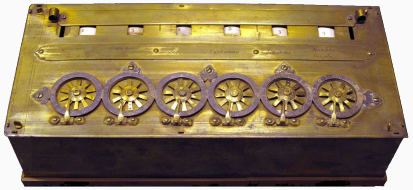

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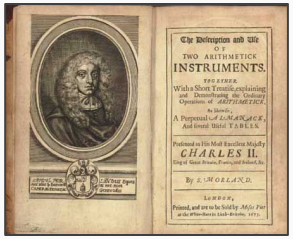

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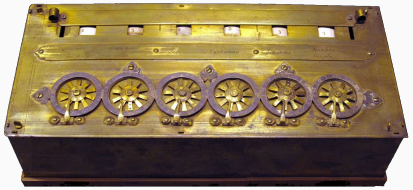

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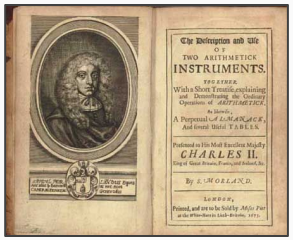

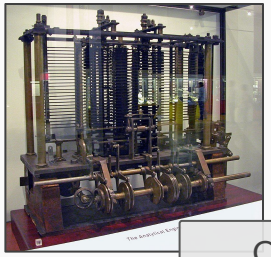

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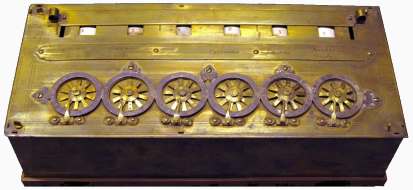

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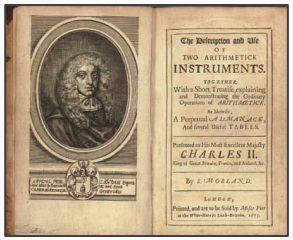

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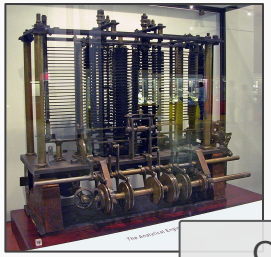

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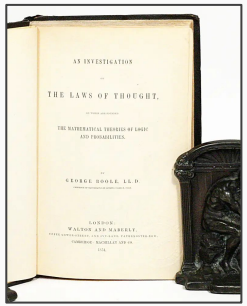

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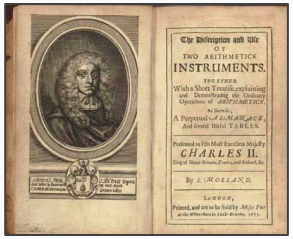

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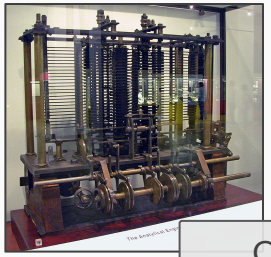

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Basic concept	Frege's notation	Modern notations
Judging	$\vdash A$, $\Vdash A$	$p(A) = 1$ $p(A) = t$
Negation	$\vdash\!\!\!\neg\ A$	$\neg A$; $\sim A$
Conditional (implication)	$\vdash$ A, B	$B \to A$ $B \supset A$
Universal quantification	$\vdash$ $\mathfrak{u}$, $\Phi(\mathfrak{u})$	$\forall y.\ \Phi(y)$
Existential quantification	$\vdash\!\!\!\neg$ $\mathfrak{u}$, $\Phi(\mathfrak{u})$	$\exists y.\ \Phi(y)$
Content identity (equal sign)	$A \equiv B$	$A = B$

Gottlob Frege developed Modern propositional logic

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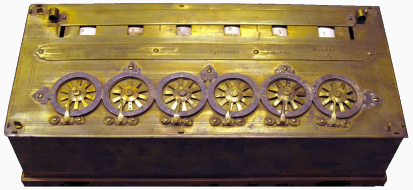

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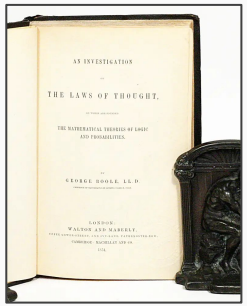

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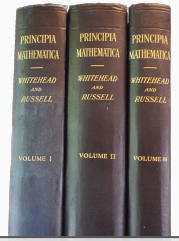

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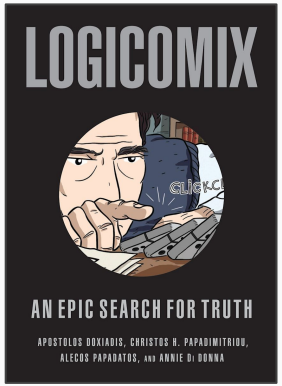

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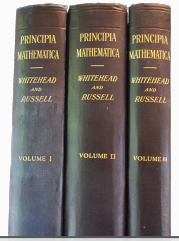

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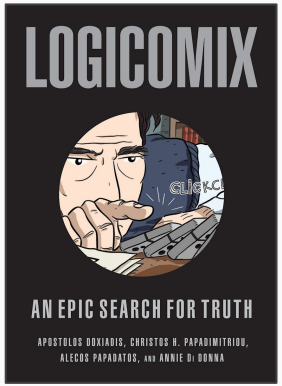

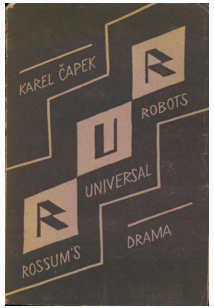

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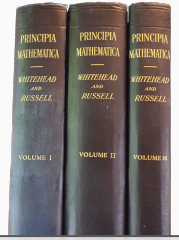

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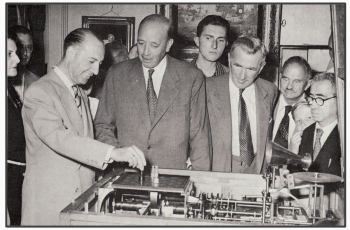

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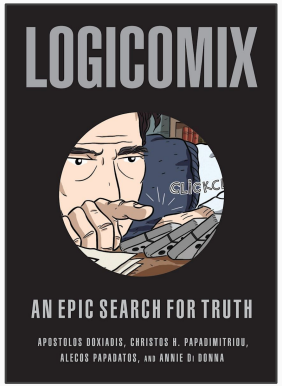

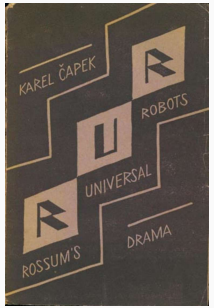

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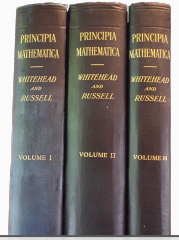

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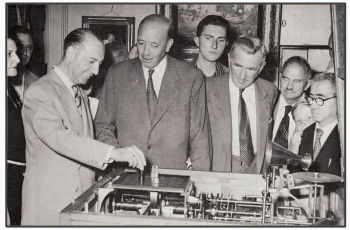

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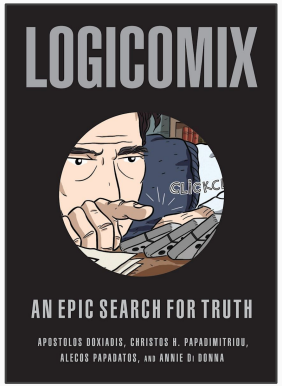

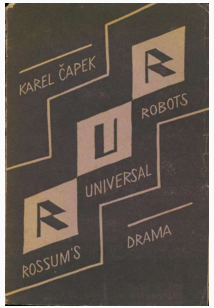

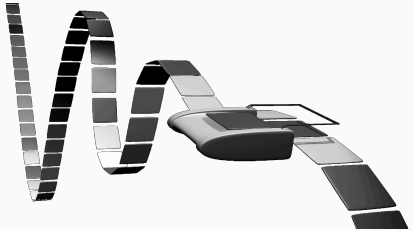

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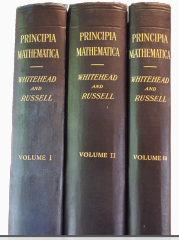

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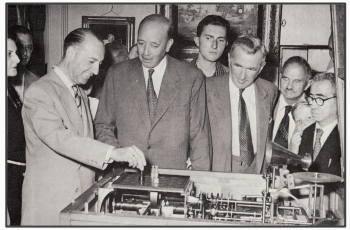

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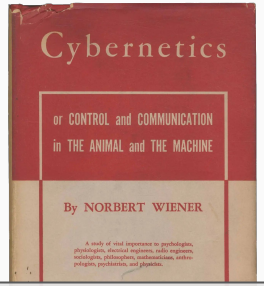

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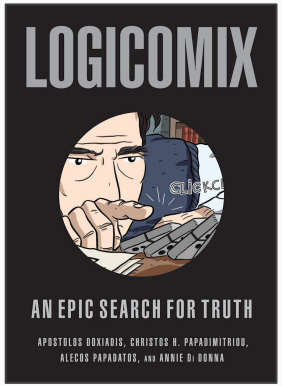

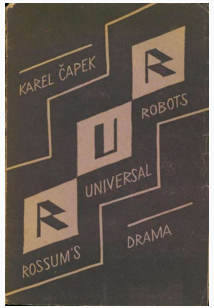

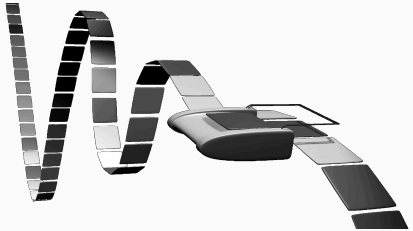

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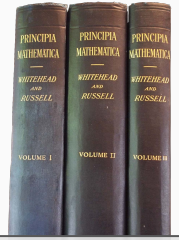

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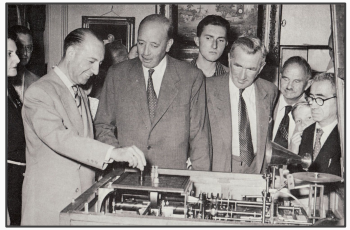

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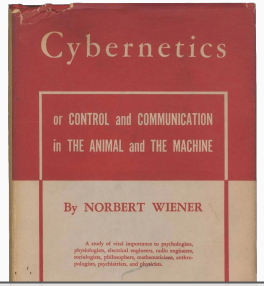

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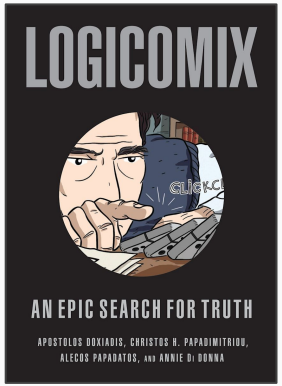

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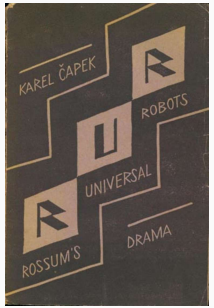

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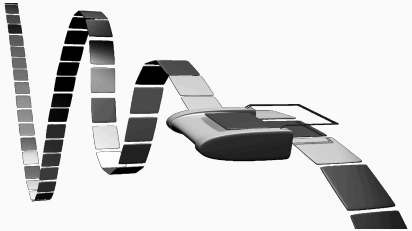

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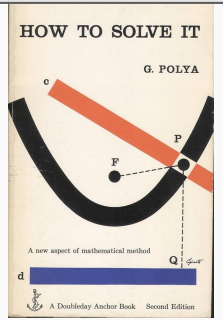

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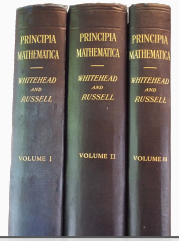

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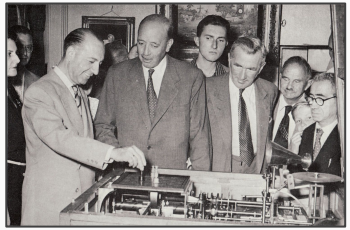

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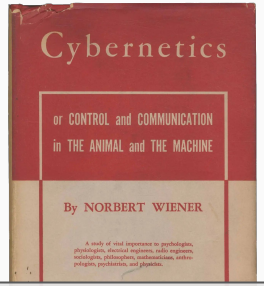

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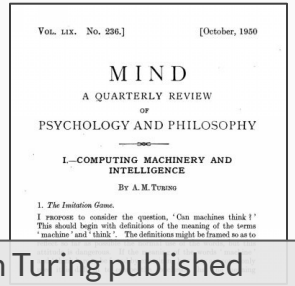

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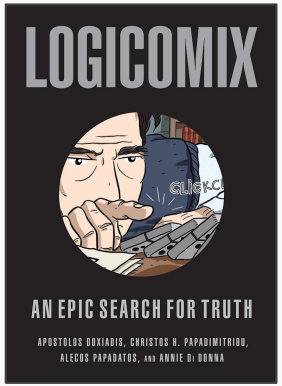
20th century

1956



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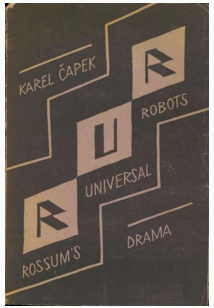

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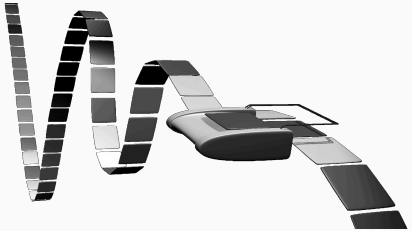

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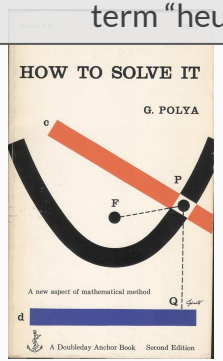

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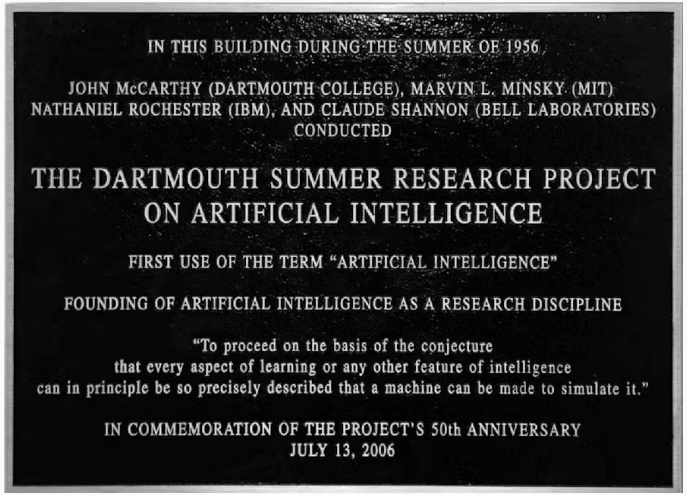

1956

McCarthy, Minsky, Rochester, & Shannon coined the term “*Artificial Intelligence*”

Which aspects were considered in this foundational summer research project ?

- Automatic Computers
- How Can a Computer be Programmed to Use a Language
- Neuron Nets
- Theory of the Size of a Calculation
- Self-Improvement
- Abstractions
- Randomness and Creativity

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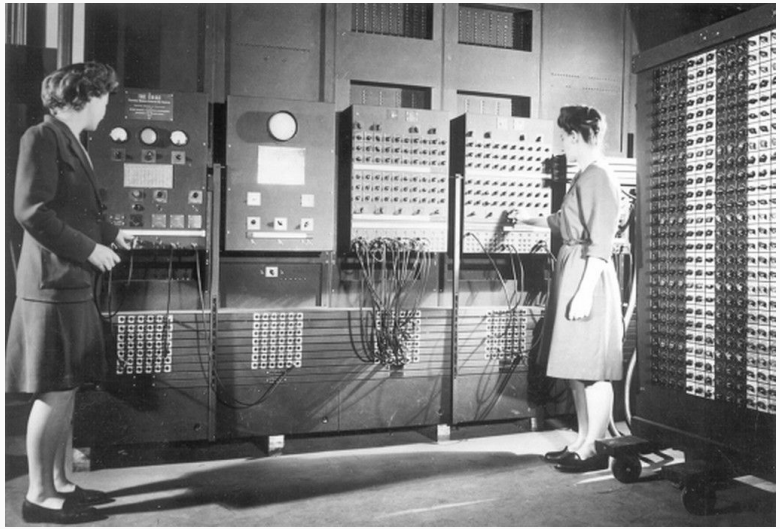
How to write artificial intelligence programmes that make effective use of this new technology ?



The first general purpose electronic computer in the world
The Electronic Numerical Integrator and Computer (ENIAC) and its programmers

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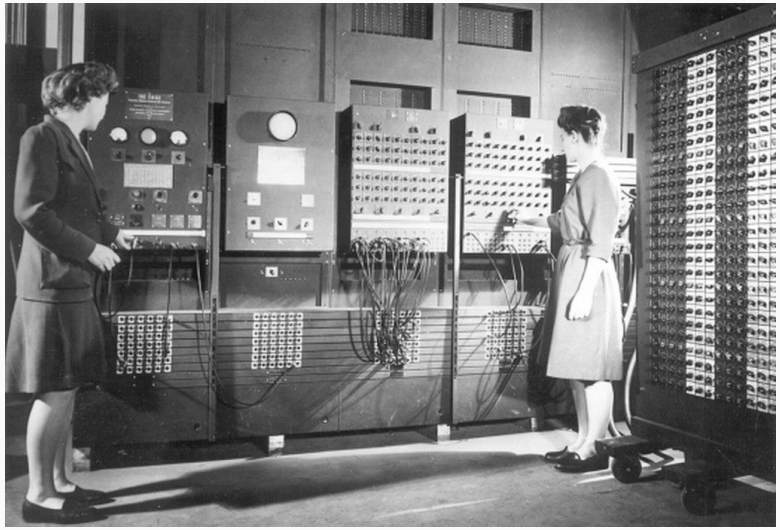
Automata Theory



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→ **LISP**, one of the first **programming languages**

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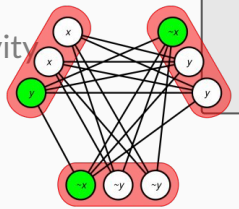

Symbolic AI - based on **symbolic logic**

Remember... *Principia Mathematica*

examples: Prolog, MILP, SAT, CP, etc.

Large Language Models (LLMs)

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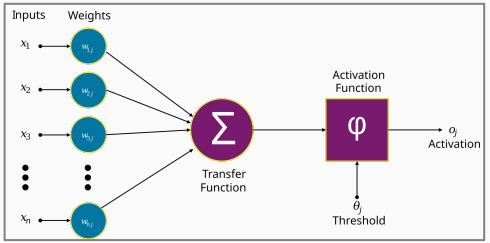

A model inspired by **biological neurons**, initially developed to:

1. Test hypothesis on brain functioning (neurosciences)
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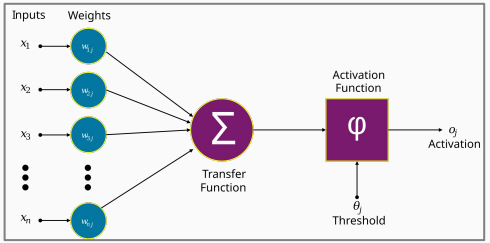

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CNNs, **Deep Learning**, etc.

Bio-inspired computing
(e.g. ant colony algorithms, genetic algorithms)

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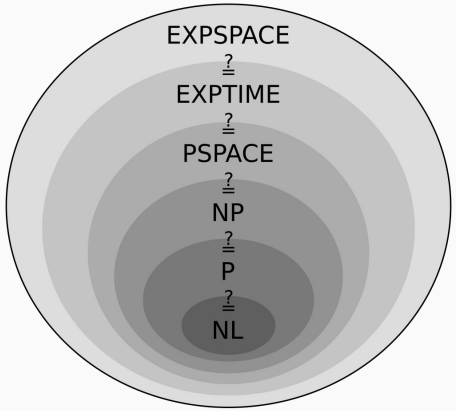
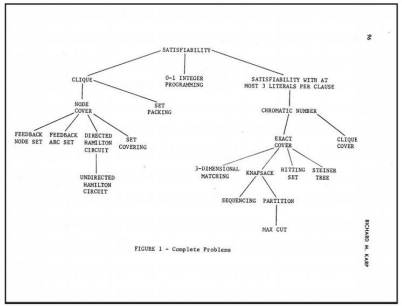
Computational Complexity Theory

*A theoretical **pillar** of modern computer science*



Karp’s 21 NP Complete Problems



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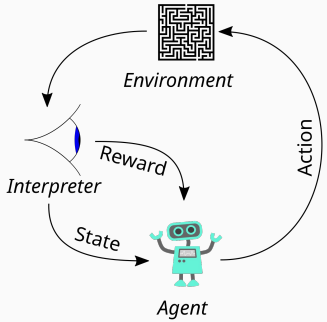
Machine learning
(e.g. reinforcement learning)



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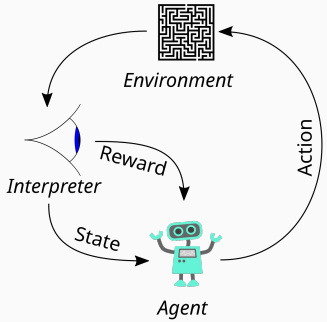
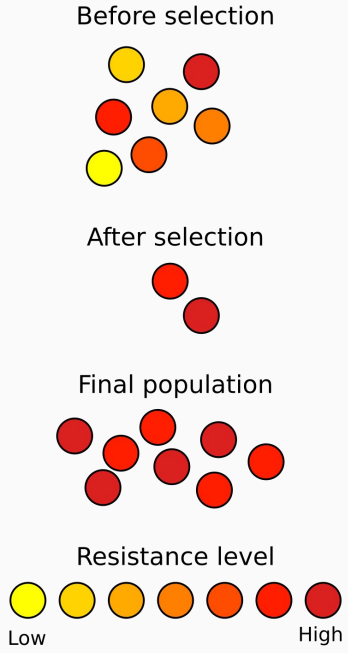
Heuristics and Meta-heuristics
(e.g. genetic algorithm)

Machine learning
(e.g. reinforcement learning)





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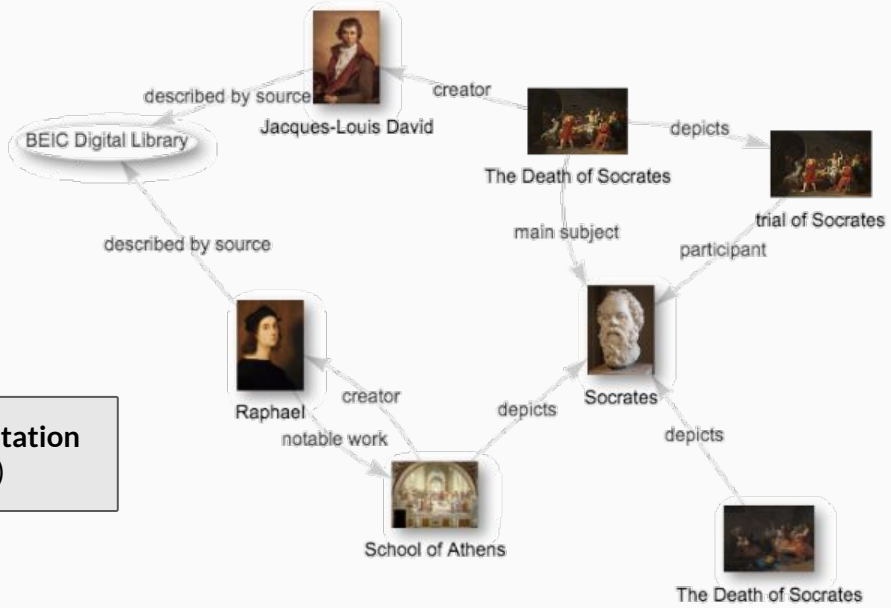
Knowledge representation
(e.g. ontologies)



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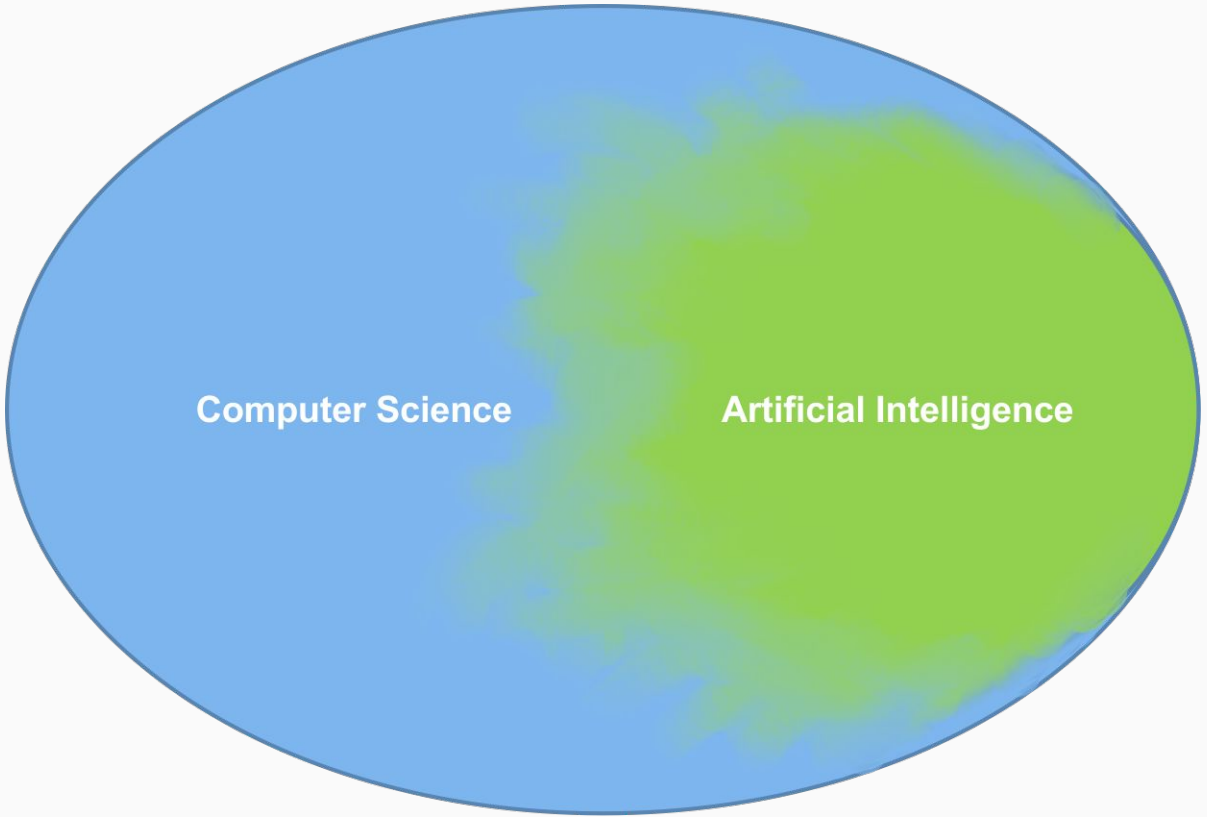
Generative AI

Take home messages

There is a fuzzy boundary between AI and non-AI-computer science



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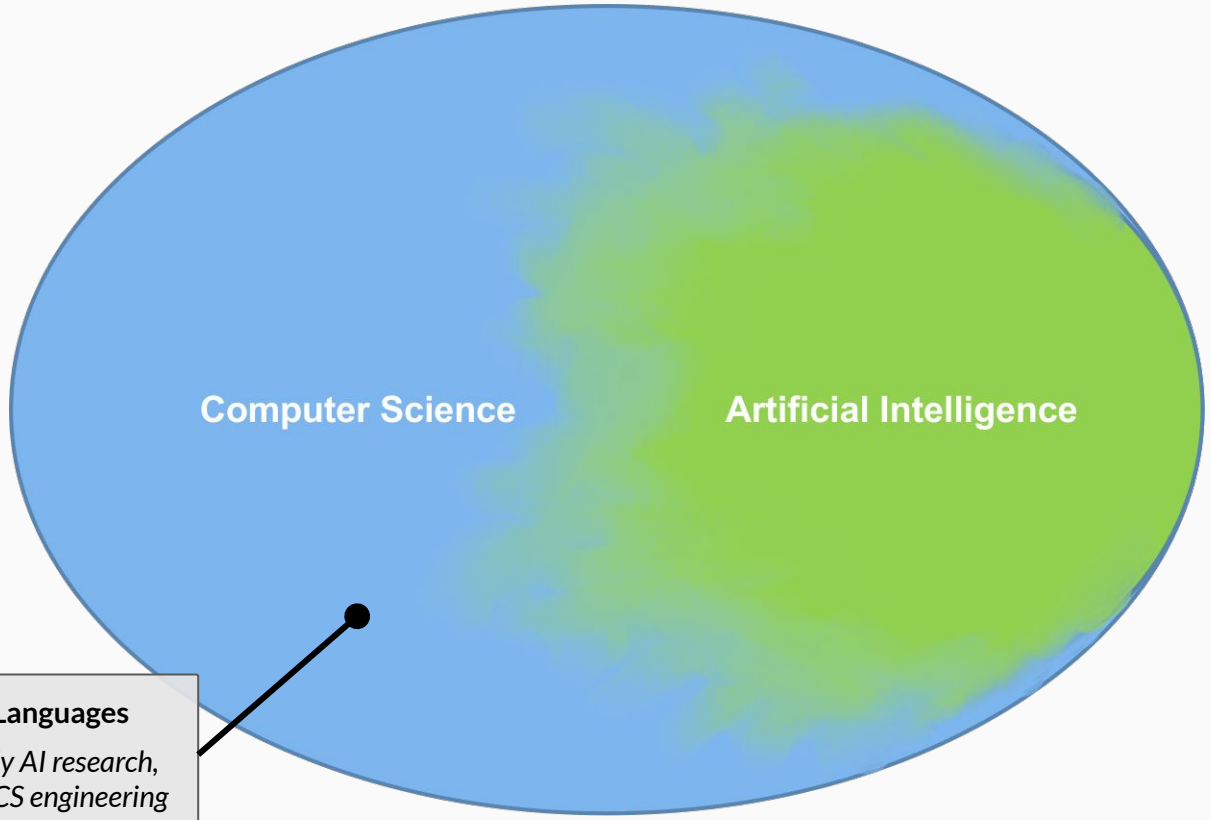

Programming Languages

At the heart of early AI research, now considered as CS engineering

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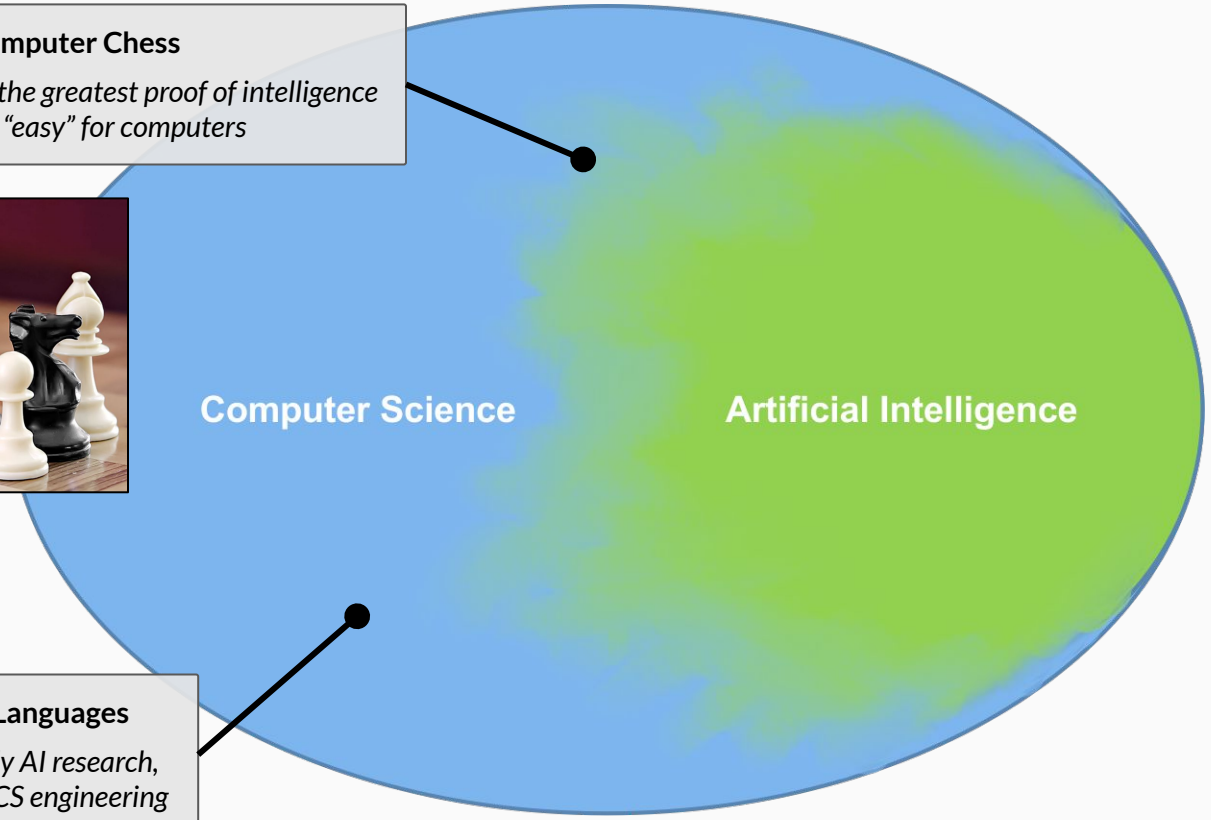
Computer Chess

Long considered as the greatest proof of intelligence
Actually "easy" for computers



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Computer Chess

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Actually "easy" for computers

Angry Birds

On the other hand, easy for humans, hard for computers

Computer Science

Artificial Intelligence

Programming Languages

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There is no strict, formal, consensual definition of “Artificial Intelligence”

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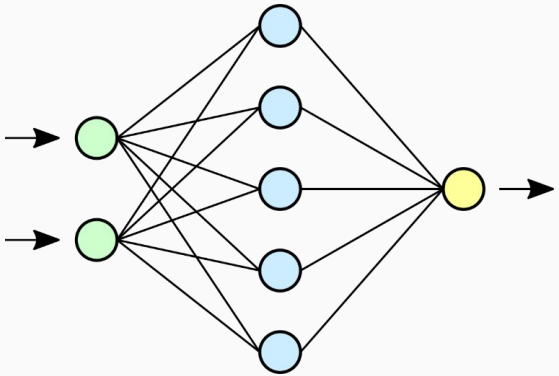
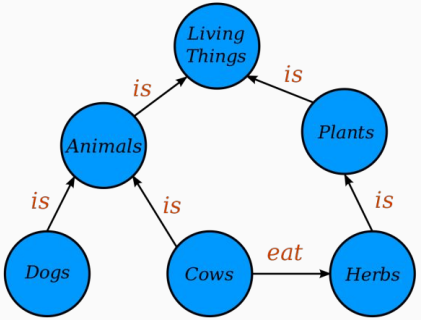
*« The construction of **computer programs** that engage in **tasks** that are currently more satisfactorily performed by human beings because they require high-level mental processes such as: perceptual **learning**, **memory organization** and critical **reasoning** »*

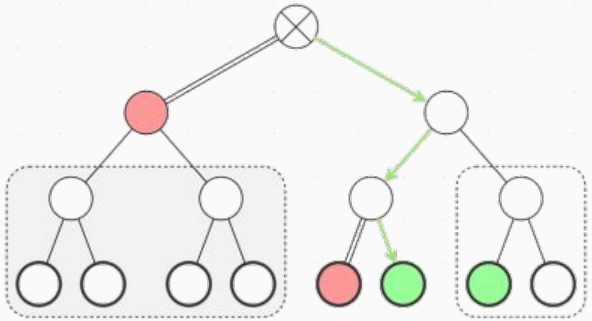
Automated learning



Knowledge representation



Automated reasoning



To go further - stay tuned about latest advances - know what is still considered as AI by AI researchers

AI international conferences

The preferred way to publish latest advances in this field

*No Impact Factor, but a ranking: **A***, **A**, **B** or **C** (CORE ranking)*

Association for the Advancement of Artificial Intelligence

IJCAI
International Joint Conferences on Artificial Intelligence Organization

IEEE
Advancing Technology for Humanity