TEKNIK INFORMATIKA
FAKULTAS TEKNIK UNIVERSITAS MATARAM

Pengantar Kecerdasan Buatan

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Short Profile ☺

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Kontrak Kuliah

- Toleransi Keterlambatan ~? menit.
- Pakaian SOPAN, bebas rapi.
- Tugas dikumpulkan sesuai deadline masing-masing tugas. Keterlambatan pengumpulan : minus 10% dari nilai (per hari keterlambatan).

- Penilaian
  - Keaktifan : 10 %
  - Tugas/quiz : 20 %
  - Mid Test : 30 %
  - Final Test : 40 %

Outline

1. Konsen Dasar Kecerdasan Buatan atau Artificial Intelligence (AI)
2. Turing Test (Imitation Game)
3. Sejarah Kecerdasan Buatan
4. Sub-field Kecerdasan Buatan

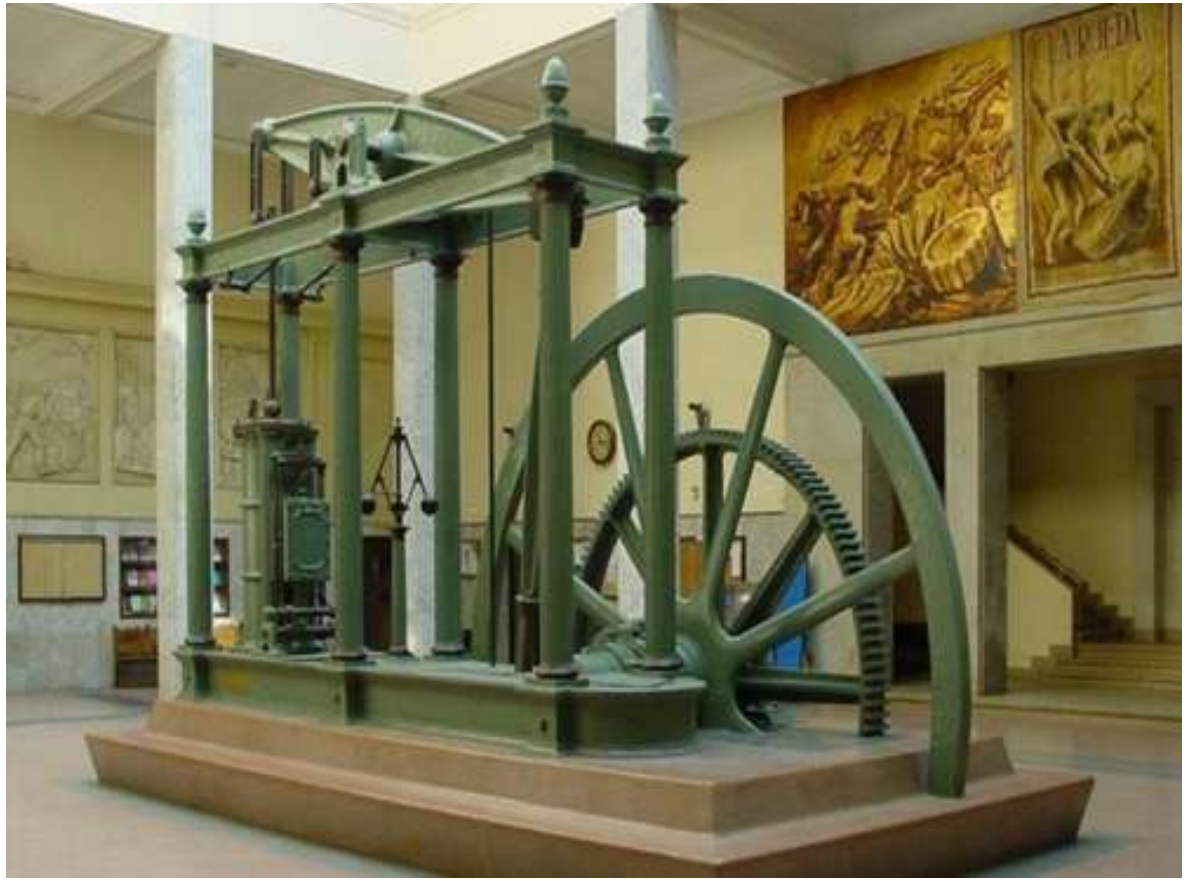
Revolusi Industri?

Revolusi Industri 1.0?

Revolusi Industri 1.0: MESIN UAP

Gambar 1. Penampakan mesin uap Watt, yang menjadi pijakan untuk revolusi industri pertama.

James Watt di tahun 1776

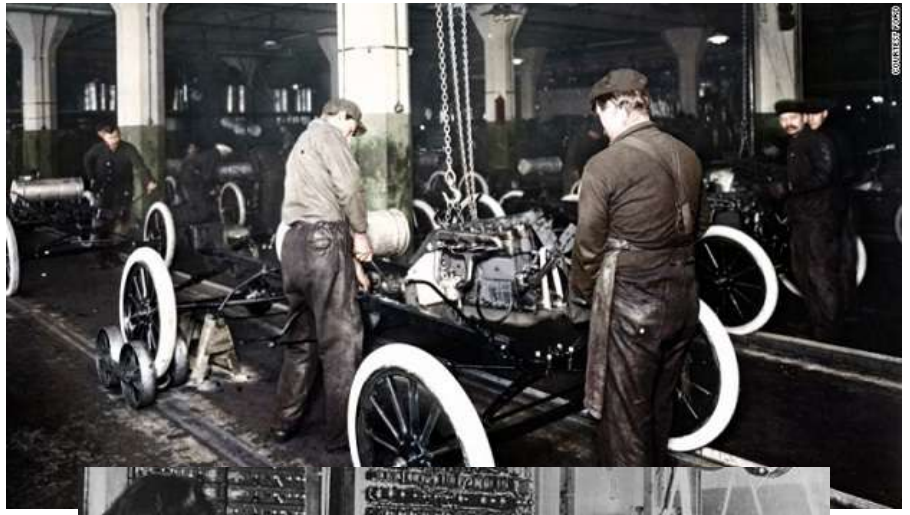


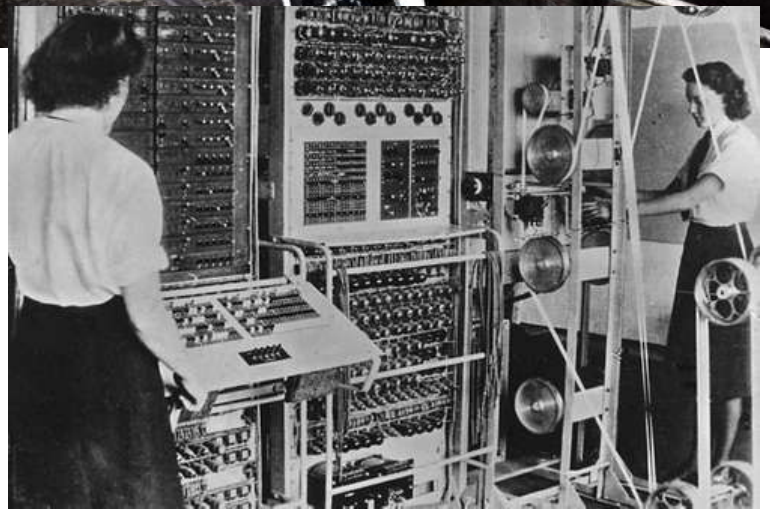
Revolusi Industri Berikutnya

- **Revolusi Industri 2.0**: Awal abad 20
  Ditemukannya Listrik dan Assembly Line

- **Revolusi Industri 3.0**: 1970an
  Ditemukannya Komputer dan Internet

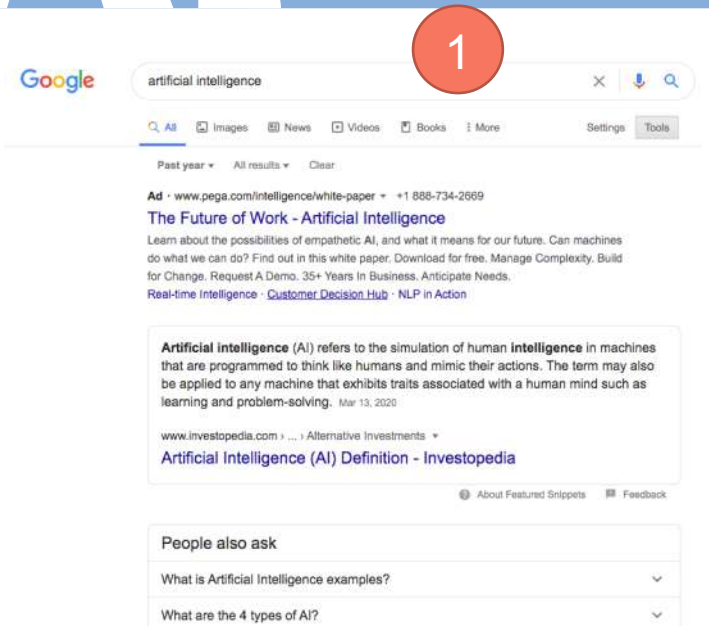
- **Revolusi Industri 4.0:** Awal abad 21
  Kolaborasi IOT dan Berkembangnya AI





AI dalam kehidupan sehari-hari

1



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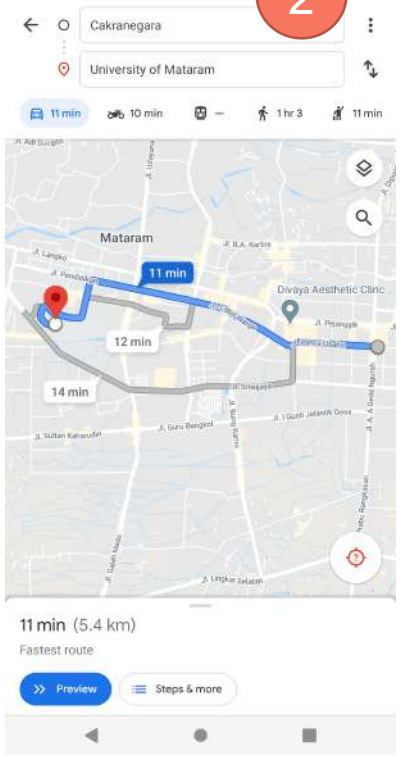

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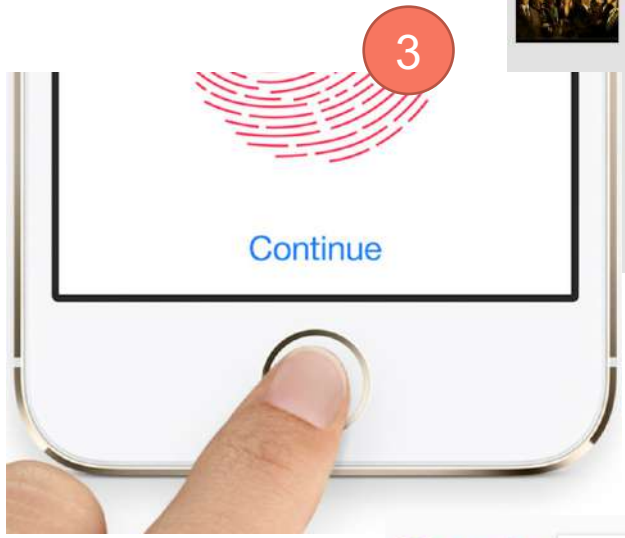

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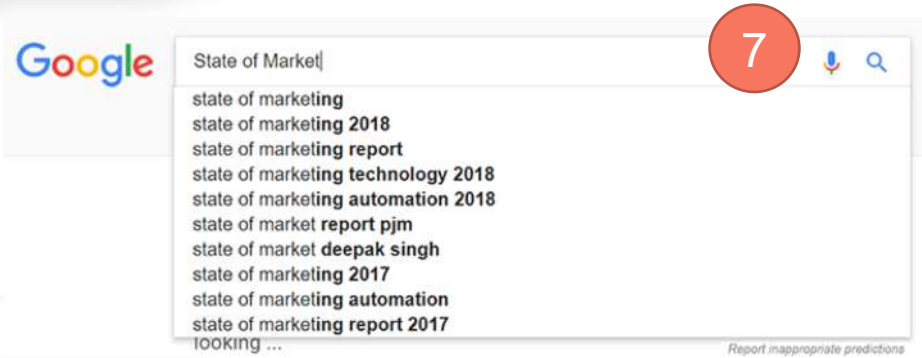


Definisi AI

Beberapa definisi Kecerdasan:

- “The ability of an organism to solve new problems.”
- “The capacity to learn or to profit by experience.”
- “Ability to adapt oneself adequately to relatively new situations in life.”

$$\textit{Intelligence} = \textit{Perceive} + \textit{Analyze} + \textit{React}$$

Artificial Intelligence is created to simulates human intelligence processes by machines, especially computer system

Definisi AI (2)

- Secara garis besar definisi Kecerdasan Buatan dapat dibagi menjadi 4 kategori: (Dari buku Stuart Russel - AI Modern Approach, 2010)

Thinking humanly	**Thinking rationally**
Otomasi aktivitas yang berhubungan dengan proses berpikir, pemecahan masalah dan pembelajaran (Bellman, 1978)	Studi tentang kemampuan mengindera dengan menggunakan model komputasi (Charniak+McDermott, 1985)
Acting humanly	**Acting rationally**
Studi bagaimana cara melakukan sesuatu sehingga menjadi lebih baik (Rich+Knight, 1991)	Cabang dari ilmu komputer yang fokus pada otomasi perilaku yang cerdas (Luger+Stubblefield,1993)

Berpikir secara rasional (Thinking rationally)

- Aristotle adalah orang pertama yang berusaha mengungkapkan pikiran yang benar (right thingking), melalui proses penalaran dan logika.
- “Socrates is a man; all men are mortal; therefore, Socrates is mortal.” Hukum-hukum pemikiran diharapkan untuk mengatur jalannya pikiran. Studi ini memulai bidang yang disebut **logic/logika**.

Permasalahan:

- Tidak semua perilaku cerdas dimediasi oleh berpikir logis
- Apa tujuan berpikir? Apa pengalaman yang seharusnya dimiliki?

Bertindak secara rasional (Acting rationally)

- Hal yang benar: bahwa yang diharapkan dapat memaksimalkan pencapaian tujuan, mengingat informasi yang tersedia.

- Tidak selalu melibatkan berpikir, misal berkedip - tetapi berpikir harus dalam rangka melakukan tindakan rasional

Berfikir seperti Manusia (Thinking humanly)

- Bagaimanakah manusia berpikir?
- Melalui introspeksi diri? – “Armchair philosophy”
- The cognitive modeling approach
- Hal ini dipelajari dalam ilmu Cognitive Science dan Cognitive Neuroscience.

Bertindak seperti manusia (Acting humanly)

- Pada th. 1950, Alan Turing mengusulkan untuk menggantikan pertanyaan “Can machines think?” dengan “Can machines behave like humans?”

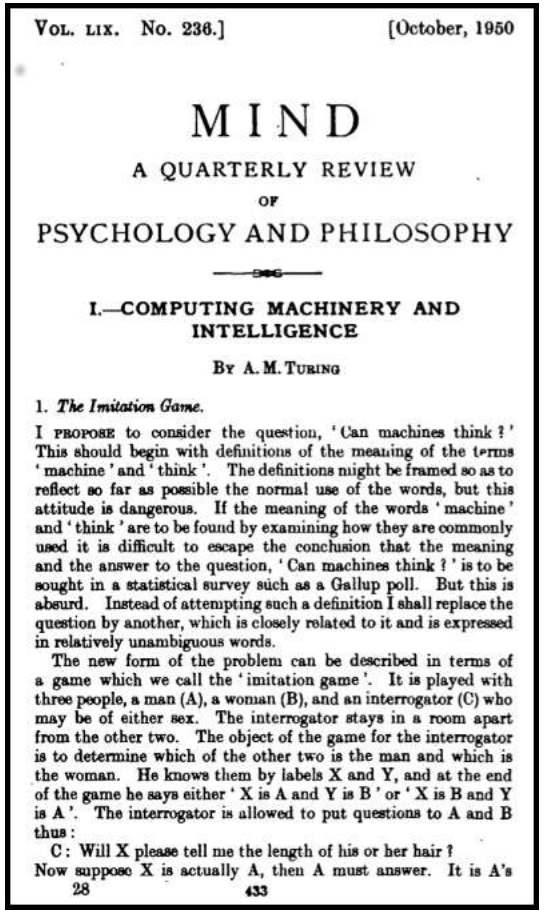
- Tujuannya: untuk memungkinkan pendekatan ilmiah – lakukan percobaan, lihat perilakunya, bukan proses di belakangnya.

- Turing mengusulkan suatu proses ujicoba yang sekarang dikenal sebagai Turing Test

The Turing Test

Film Imitation Game

Mesin Enigma



Vol. LIX. No. 236.] [October, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

By A. M. Turing

1. *The Imitation Game.*

I propose to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?

Now suppose X is actually A, then A must answer. It is A's

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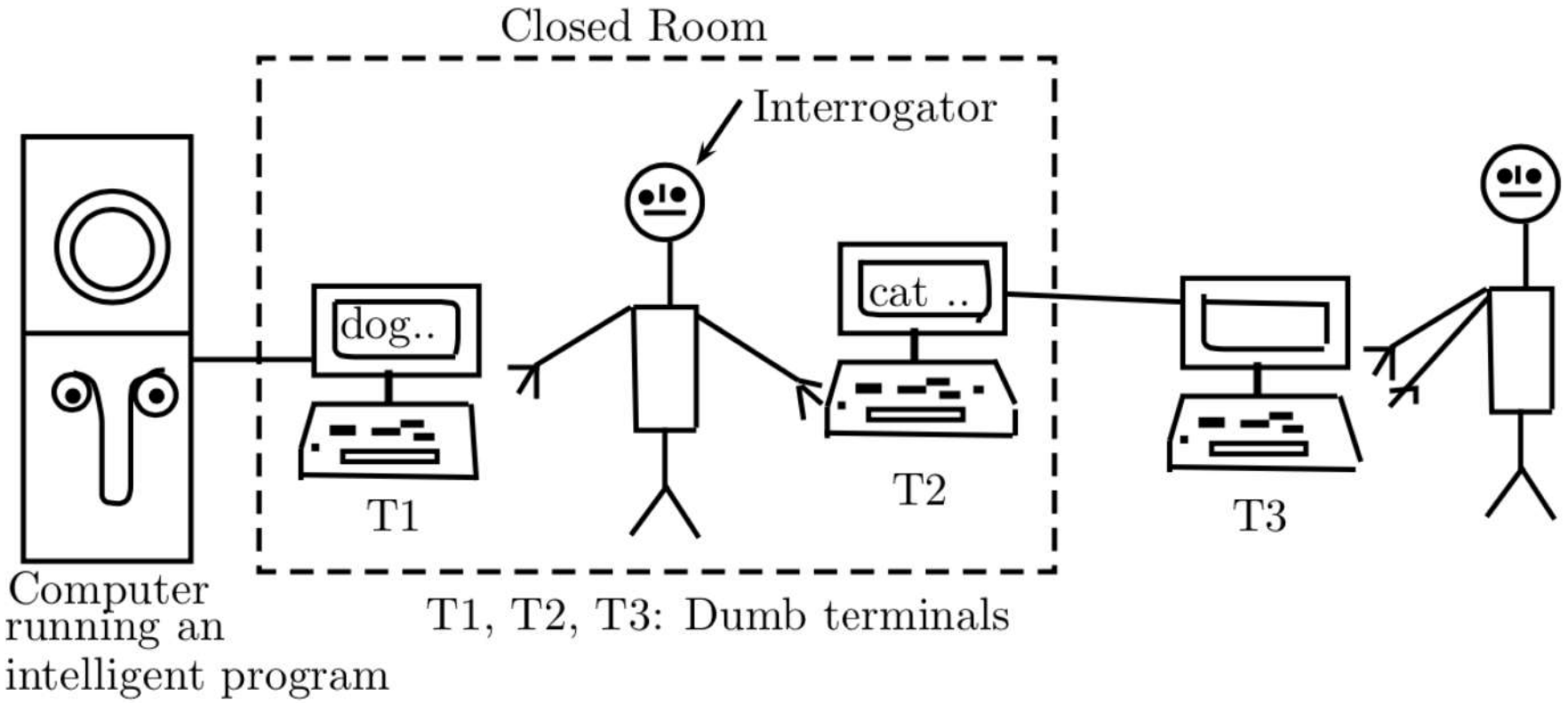
Paper Alan Turing

Turing Test (Imitation Game)



AI Passed Turing Test?

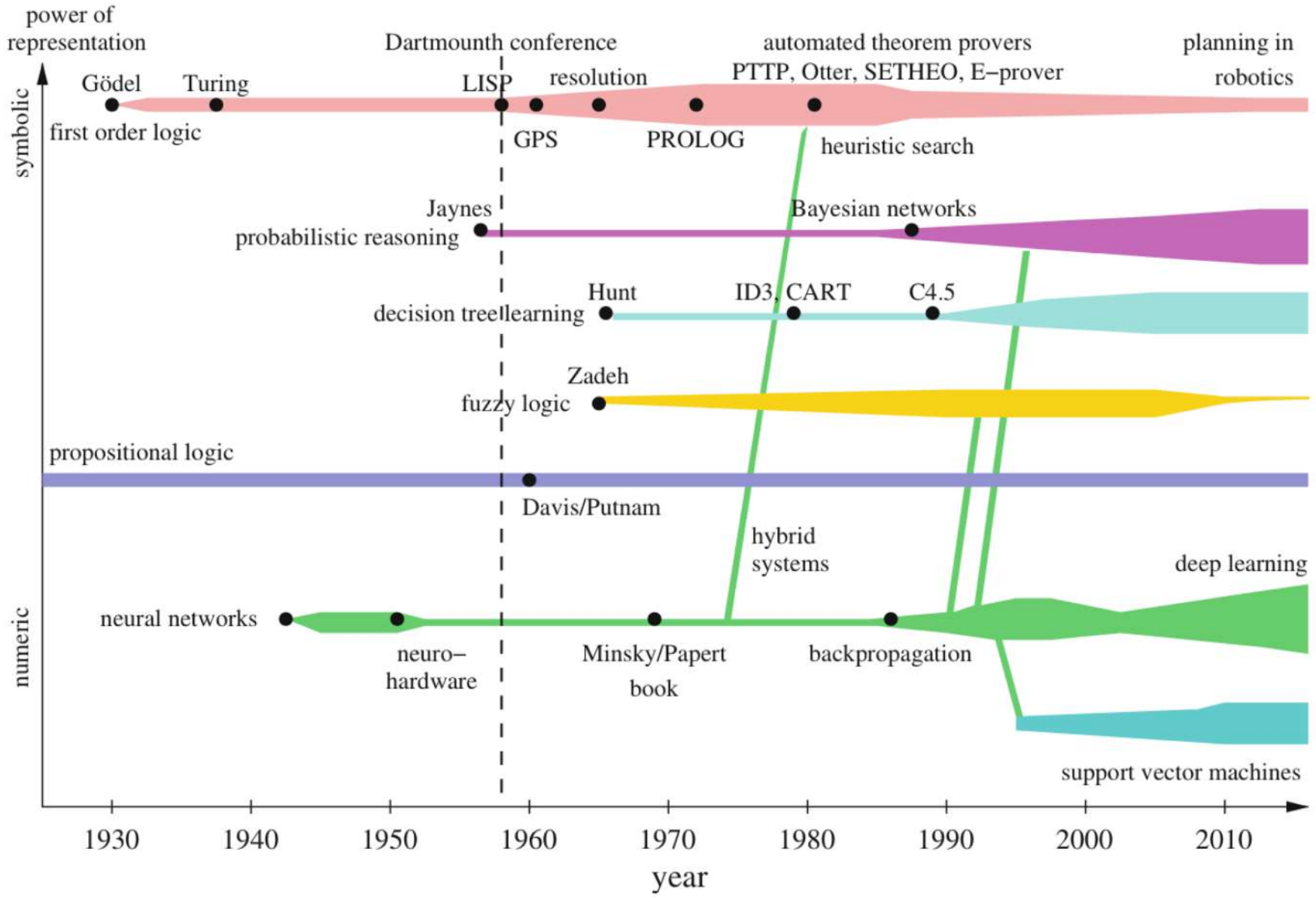
Google I/O 2018

Source video:
https://youtu.be/mCh_r6HoDn4

Sejarah AI

Tahun	Milestone AI
1931	Kurt Gödel shows that in first-order predicate logic
1943	McCulloch & Pitts: Boolean circuit model of brain
1950	Turing's "Computing Machinery and Intelligence"
1956	McCarthy organizes a conference in Dartmouth College. Here the name Artificial Intelligence was first introduced.
1961	The General Problem Solver (GPS) by Newell and Simon imitates human thought
1965	Robinson's complete algorithm for logical reasoning (resolution calculus for predicate logic)
1969-79	Early development of knowledge-based systems
1980-88	Expert systems industry booms
1985-95	Neural networks return to popularity
1995	From statistical learning theory, Vapnik develops support vector machines, which are very important today.

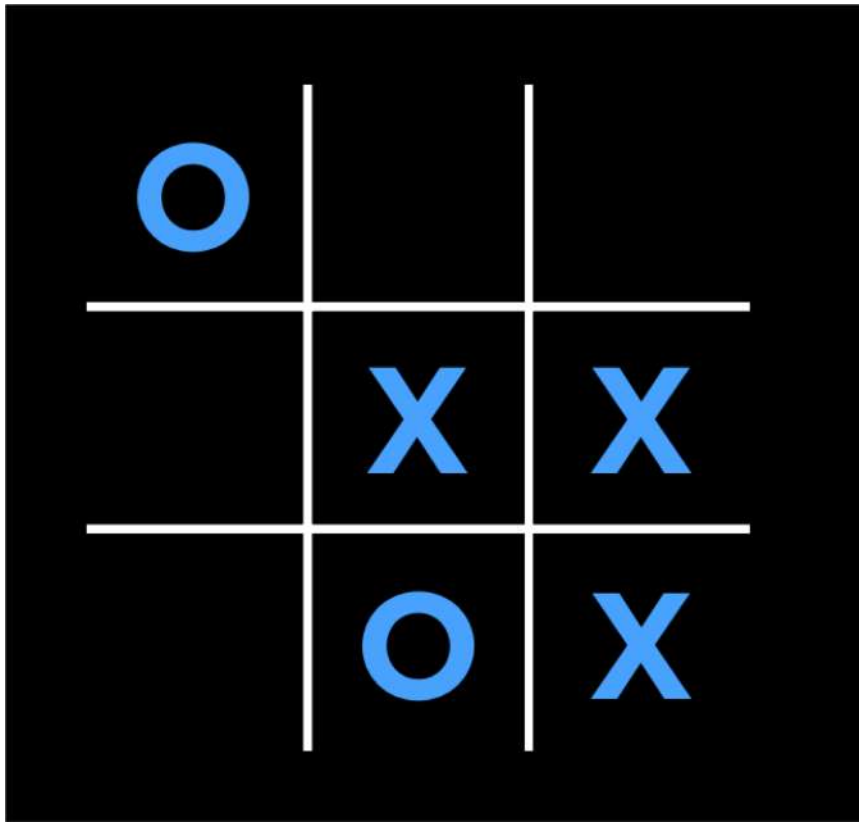
Sejarah AI



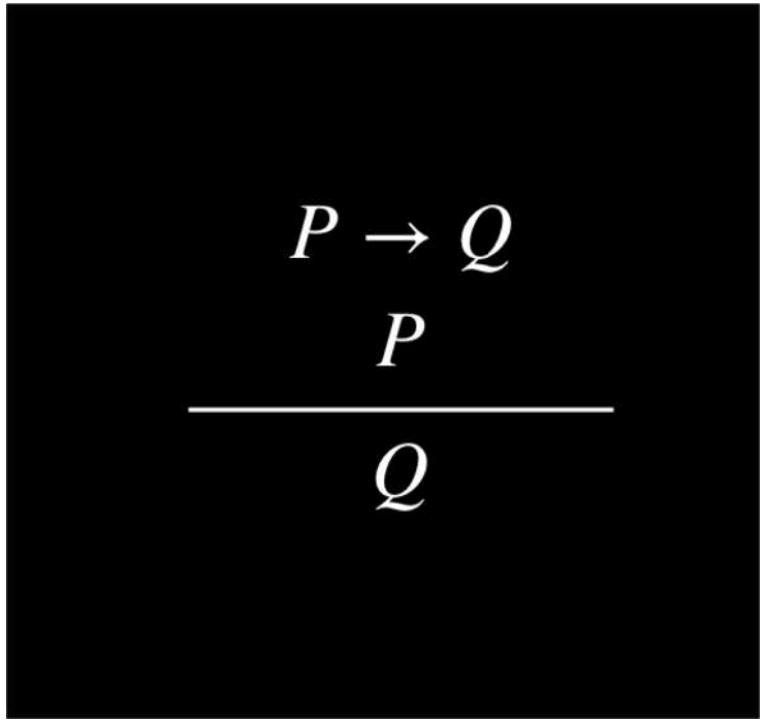
Wolfgang Ertel

"Introduction to Artificial Intelligence"

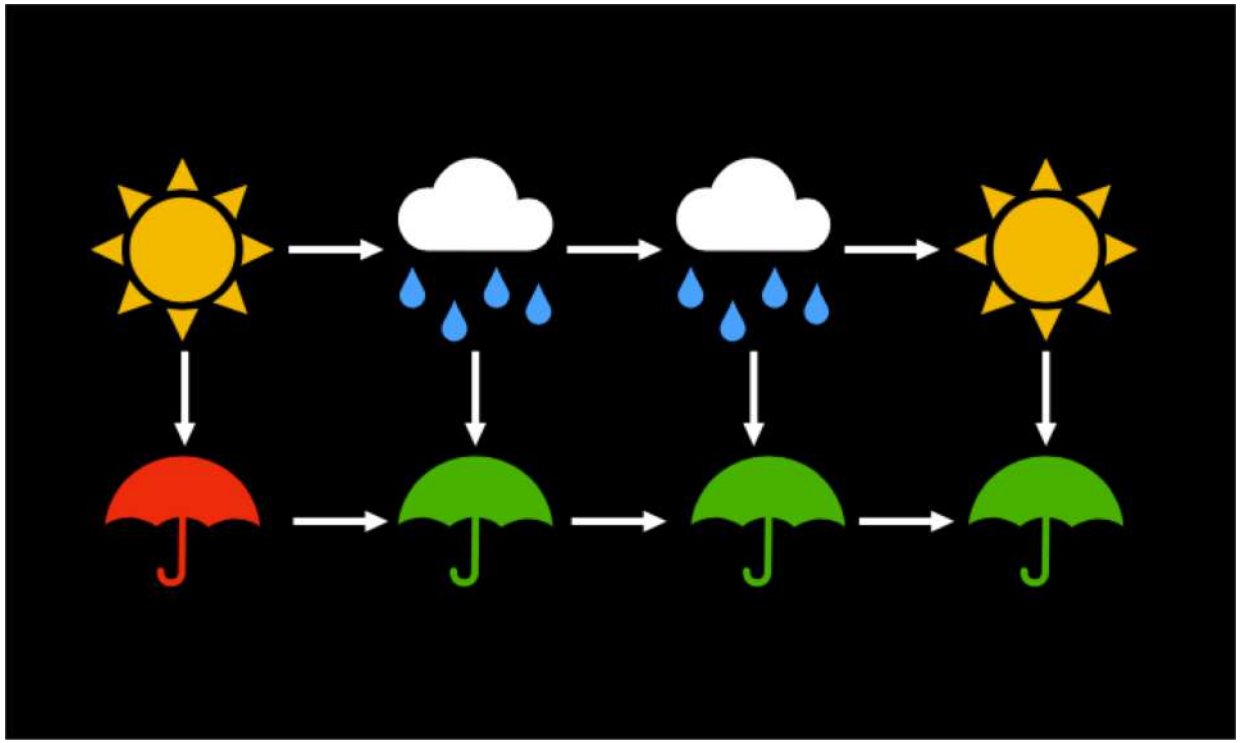
- SEARCH



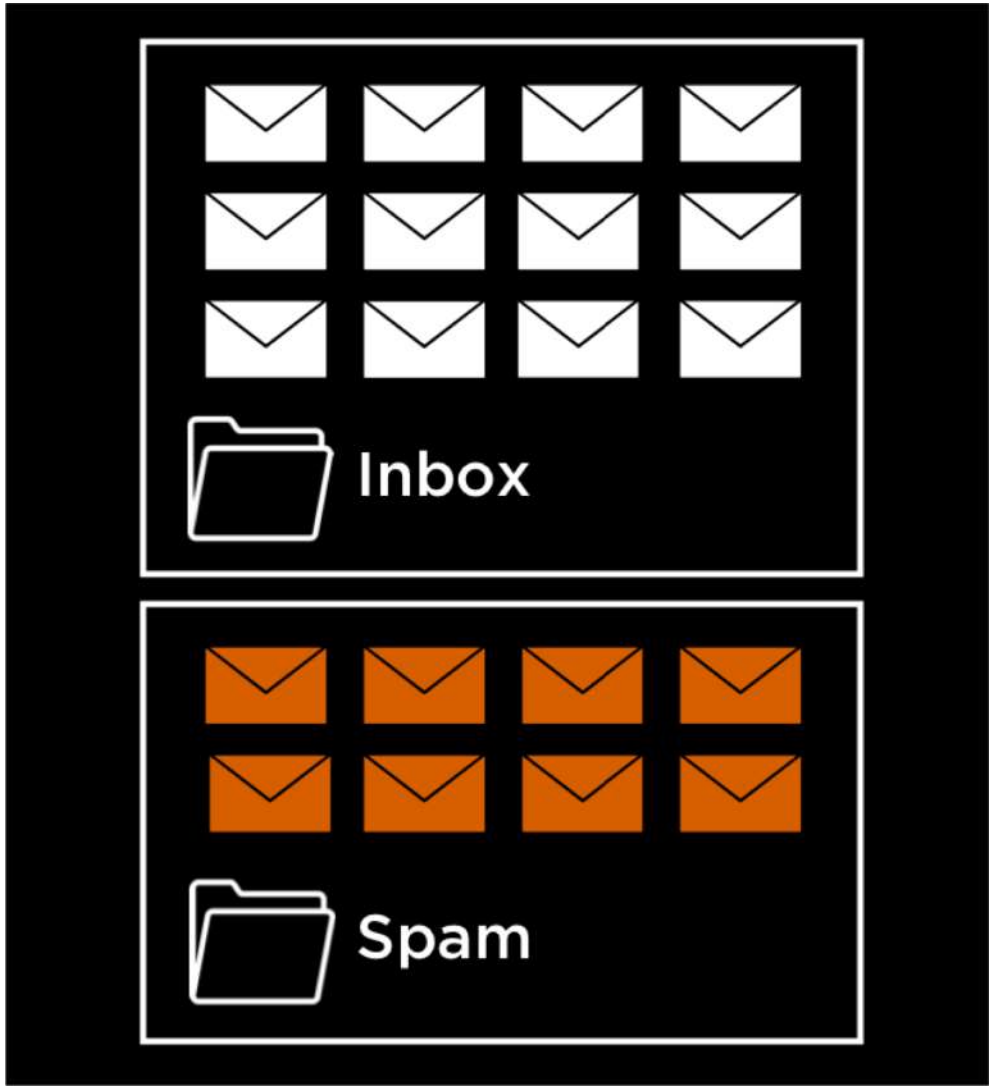
- KNOWLEDGE



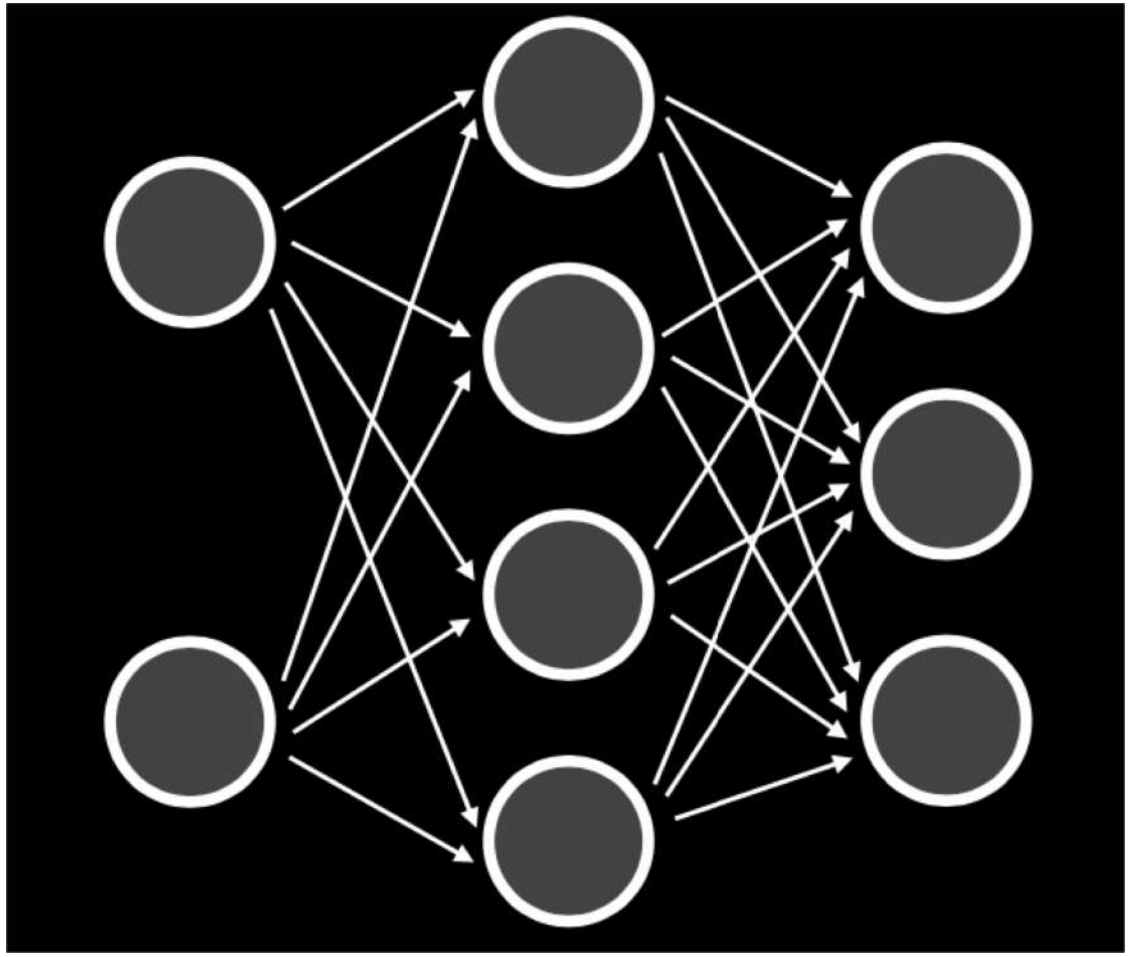
- UNCERTAINTY



- LEARNING



- NEURAL NETWORK



Sub-fields of AI

- ***Speech Processing***: To understand speech, speech generation, machine dialog, machine user-interface.
- ***Natural Language Processing***: Information retrieval, Machine translation, Ques- tion/Answering, summarization.
- ***Planning***: Scheduling, game playing.
- ***Engineering and Expert Systems***: Troubleshooting medical diagnosis, Decision support systems, teaching systems.
- ***Fuzzy Systems***: For fuzzy controls.
- ***Models of Brain and Evolutionary***: Genetic algorithms, genetic programming, Brain modeling, time series prediction, classification.
- ***Machine Vision and Robotics***: Object recognition, image understanding, Intelligent control, autonomous exploration.
- ***Machine Learning***: Decision tree learning, version space learning.