Artificial Intelligence (CS6380)

Course logistics

Anantha Padmanabha

Email: ananthap@cse.iitm.ac.in

Office: SSB 103

Ritwiz Kamal

Email: ritwizkamal@gmail.com

Meghana Nasre

Email: meghana@cse.iitm.ac.in

Office: SSB 114

Dinesh Katravath

Email: cs24m018@smail.iitm.ac.in

Slot: F Slot (T: 5.00pm, W: 11.00am, Th: 9.00am, F: 8.00am)

Venue: SSB134



Amazon personalize



Kar-go in London delivering medicines



10:43

Dear MEGHANA NASRE,

Renewal Reminder for your two wheeler TN07DH5724 HONDA MOTORCYCLE AND SCOOTER INDIA (P) LTD ACTIVA STD Code-SCV110P7ID Own Damage Insurance will expire on

Info pa1 innovsource

25-Jun-25

POLICY EXPIRE DETAILS:COMPANY NAME: ICICI Lombard
General Insurance Co. Ltd.
OWN DAMAGE: 26-Jun-24 TO

25-Jun-25

THIRD PARTY : 26-Jun-24 TO

25-Jun-29

For More Clarification call us Name: PRIYA

Mobile Number: +919429693789

3:10 PM

(a) \$ (b) \$ (c) \$

← Renew Now

← Not Interested

← Call Back

Info pa1 innovsource
Dear MEGHANA NASRE,
Renewal Reminder for your two wheeler

0

TN07DH5724 HONDA MOTORCYCLE AND S..

Renew Now

Message







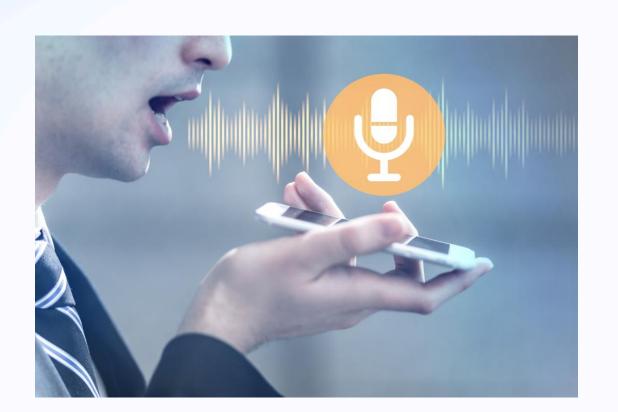
5:12 PM 😽



Al is all around us



Swaayatt Robots: autonomous driving



Speech recognition

What is Artificial Intelligence?

Def. 1: The exciting new effort to make computers think... <u>machines with</u> <u>minds</u>, in the full and literal sense. (Haugeland, 1985)

Def. 3: The study of mental faculties through the use of computational models. (Charniak and Mc Dermott, 1985)

Def. 2: Study of how to make computers do things which, at the moment, people are better. (Rich and Knight 1991)

Def. 4: Computational Intelligence is the study of design of intelligent agents. (Poole et al., 1998)

Like Humans

VS

Rationally

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S

Act

Def. 2: Study of how to make computers do things which, at the moment, people are better. (Rich and Knight 1991)

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Thinking humanly: the cognitive modeling approach



How do humans think?

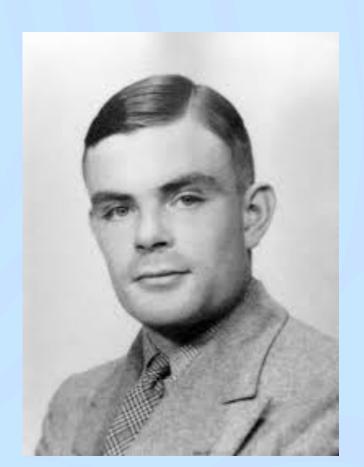
Get inside the workings of human brain

- Introspection (catch our thoughts)
- Psychological experiments

Newell and Simon (General Problem Solver, 1961)

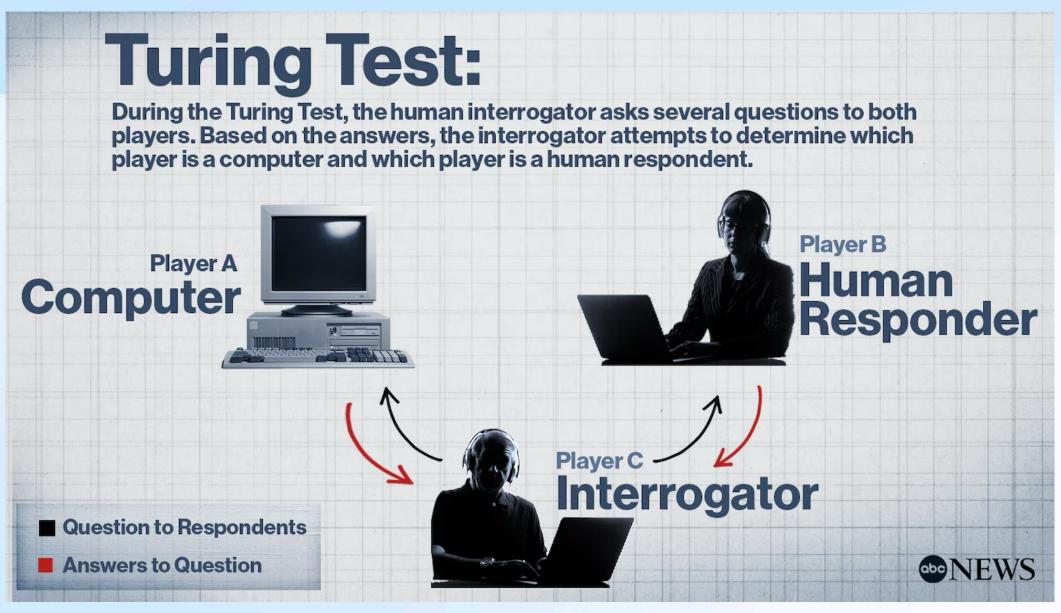
- Not content with correct solutions to problems
- Wanted to understand the trace of reasoning of program and compare it with human reasoning.

Acting humanly: The Turing Test approach



Alan Turing: Father of Computer Science

Devised the imitation game (1949–50)



Turing Test: Computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses came from A or B.

Capabilities to pass the Turing Test:

- Natural language processing
- Knowledge representation
- Automated reasoning
- Machine learning
- Computer vision
- Robotics

Acting humanly: Turing test and other tests

```
Welcome to
                   EEEEEE LLLLLL IIII ZZZZZZ
 Eliza is a mock Rogerian psychotherapist.
  The original program was described by Joseph Weizenbaum in 1966.
  This implementation by Norbert Landsteiner 2005.
ELIZA: Is something troubling you ?
YOU: Men are all alike.
ELIZA: What is the connection, do you suppose?
YOU: They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU: Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU: He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU: It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
```

Lobner prize: Contest held every year (2003–2019)

- Format like Turing test
- Rules changed over the years
- Criticism: success depends on deception, chatbots can dot well using cheap tricks

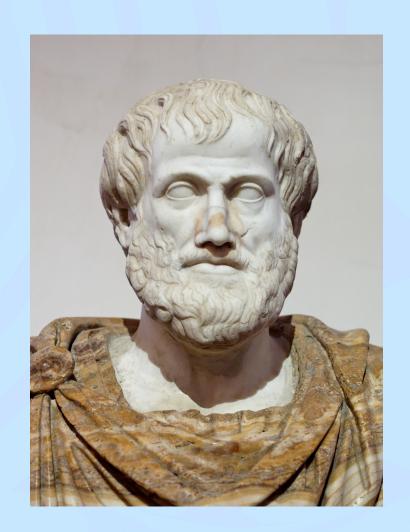
Winogard schema: multiple choice questions that can be answered easily by humans but cannot be answered by computers using cheap tricks.

- The trophy wouldn't fit in the brown suitcase because it was too small. What was so small?
- The trophy wouldn't fit in the brown suitcase because it was too big. What was so big?

Winogard schema challenge: Held in IJCAI in July 2016.

 6 entries, best system got 58% correct answers, humans get 90%.

Thinking rationally: the laws of thought approach



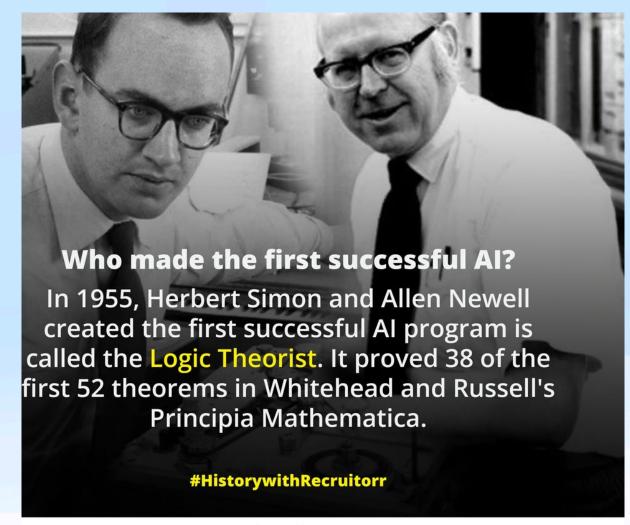
Syllogisms

Socrates is a man.
All men are mortal.
Implies: Socrates is mortal.

Aristotle: attempt to codify right thinking

Use logic programming to solve problems in Al

- Problems are translated into a set of facts and rules
- Declarative nature of logic programming
 - says what to do, not how to do
- Prolog, datalog, lisp, answer set programming, ...



recruittalks.com

LT: inference systems

Issues: Computational complexity, dealing with uncertainty, ..

Acting rationally: the rational agent approach

Agent: one that acts (agere: to do)

Computer agent: perceive the env., operate autonomously, persist over time, adapt over time, set and pursue goals

Rational agent: one that acts to achieve the "best" outcome

Rational agent approach vs other approaches

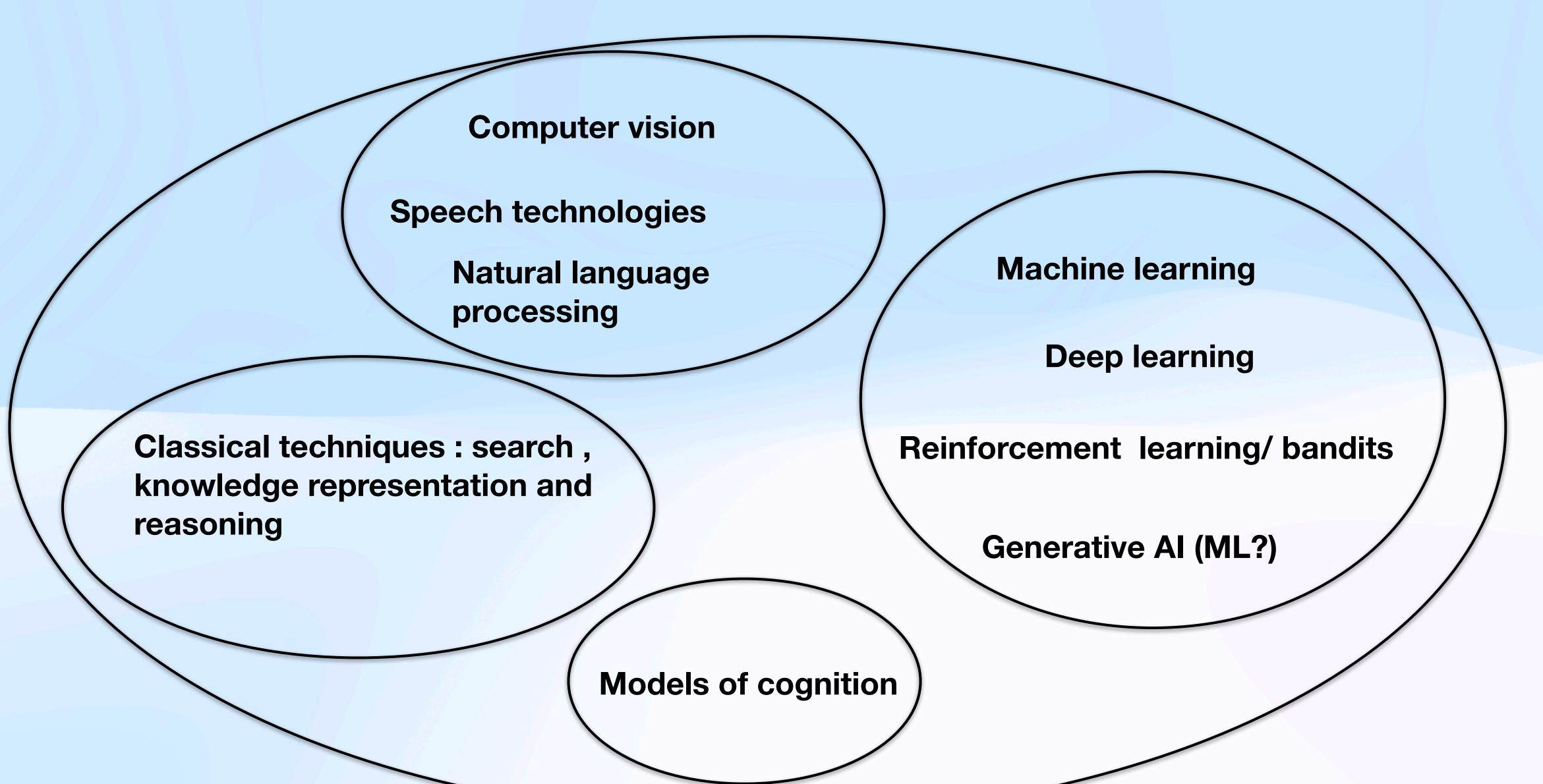
- Goes beyond explicit reasoning and Human cognition.
- Can be adapted to many real world problems.

Focus in the course: study and design of agents that do the right thing.

Rational agents vs. beneficial machines

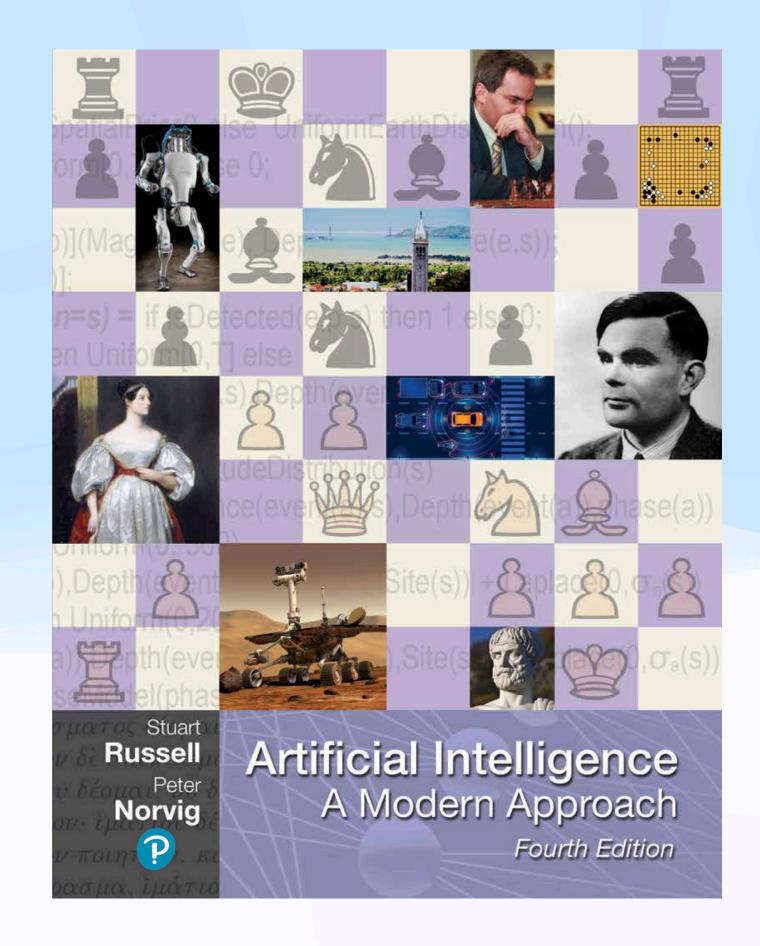
Agent objectives vs our objectives.

AI/NL courses



Course outline and logistics

- Agents and environments
- Problem solving
 - Search Methods for Problem Solving
 - Search in Complex Environments
 - Constraint Satisfaction Problems
 - Adversarial Search and Games
- Knowledge and Reasoning
 - Knowledge Based Gents
 - Propositional Logic and First Order Logic
 - Using logic to make inferences
- Planning
 - Knowledge Representation
 - Classical Planning: Algorithms, heuristics
 - Hierarchical Planning
- Data driven Al

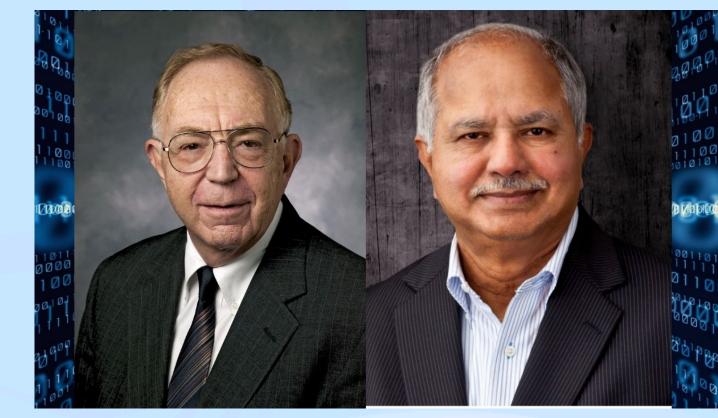


Course evaluation plan

- Midsem (30), Endsem (40)
- Assignments + tutorials worth 30 marks.

Turing Award winners and historical perspective

- Marvin Minsky (1969) and John McCarthy (1971)
- Allen Newell and Herbert Simon (1975)
- Ed Feigenbaum and Raj Reddy (1994)
- Judea Pearl (2011)
- Yoshua Benigo, Geoffrey Hinton, Yang LeCun (2018)



Ed Feigenbaum and Raj Reddy



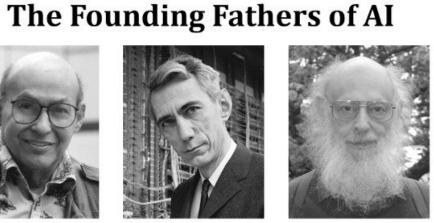


Marvin Minsky



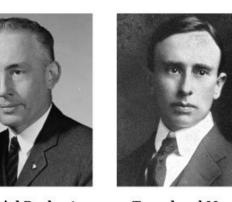
Claude Shannon

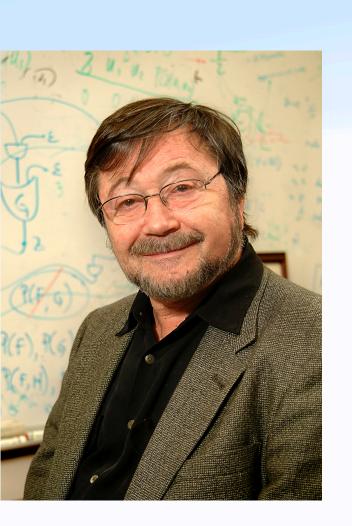
1956 Dartmouth Conference:



Ray Solomonoff

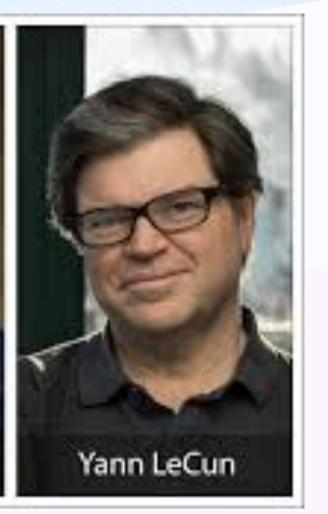






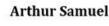


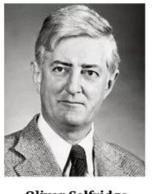










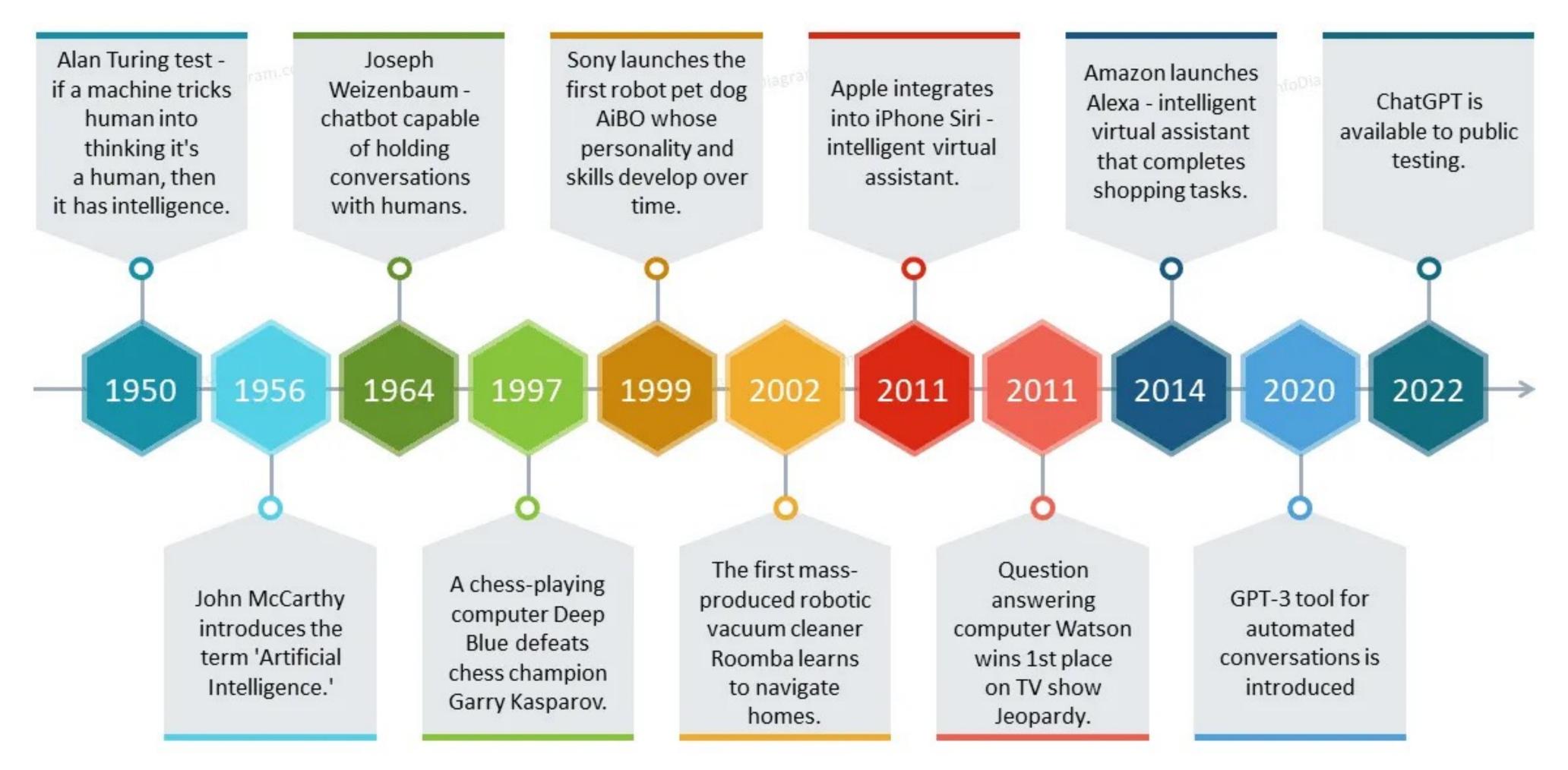






Judea Pearl

Artificial Intelligence Development History Timeline



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