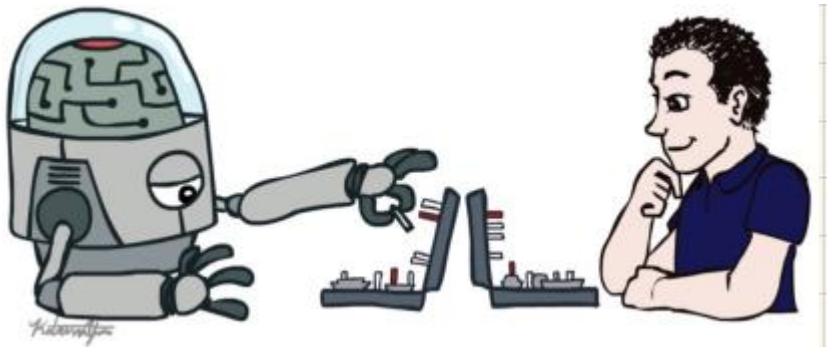
Artificial Intelligence (BCSE306L)

Module 01 - Introduction



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Lecture Outline

- Introduction to AI
  - Definition of AI
  - View of AI
  - Application of AI

Have you used AI today?

- Think about your day so far...






What is the AI?

- What is the first thing that comes to your mind when you hear "AI" ?

Sci-Fi Robot:
Terminator, Walle

Smart Assistant:
Siri, Alexa, Google

Recommendation System:
Flipkart, Amazon

Generative AI:
ChatGPT, Gemini, Claude

Definition of AI

- Formal definition of AI

> **"Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs."**
> *— John McCarthy, 1955 (Father of AI)*

- AI is the simulation of human intelligence in machines programmed to think and learn like humans.

- It enables machines to perform tasks that typically require human cognition.

Definition of AI

AI is the simulation of **human intelligence** in machines programmed to ***think*** and ***learn like humans***.
It enables machines to perform tasks that typically require human cognition.

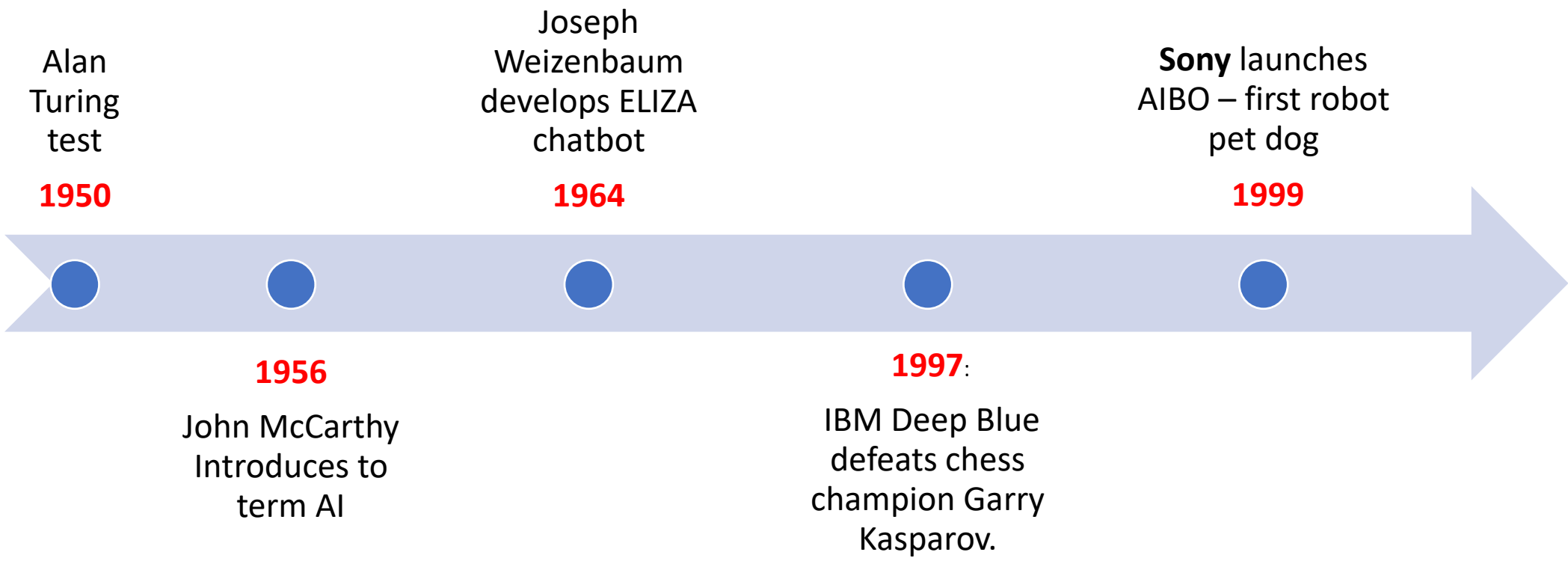
Key Capabilities:

- **Learning:** Acquiring knowledge from data.
- **Reasoning:** Solving problems and making logical deductions.
- **Decision-making:** Choosing optimal actions based on learned patterns.

Types of AI:

- **Narrow AI (ANI):** Performs specific tasks (e.g., Chess AI).
- **General AI (AGI):** Human-level intelligence across many tasks (hypothetical).
- **Super AI (ASI):** Exceeds human intelligence (speculative).

Evolution of AI (History of AI)



Evolution of AI (History of AI) -2

ROMBO – first mass produced robotic vacuum cleaner

2002

IBM WATSON

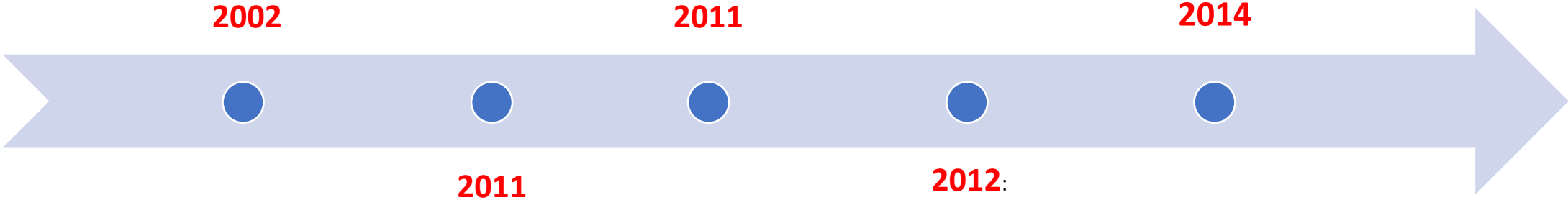
wins Jeopardy

(**KBC** of USA)

2011

Ian Goodfellow proposed **GAN**

2014



2011

Apple introduced **siri**

2012:

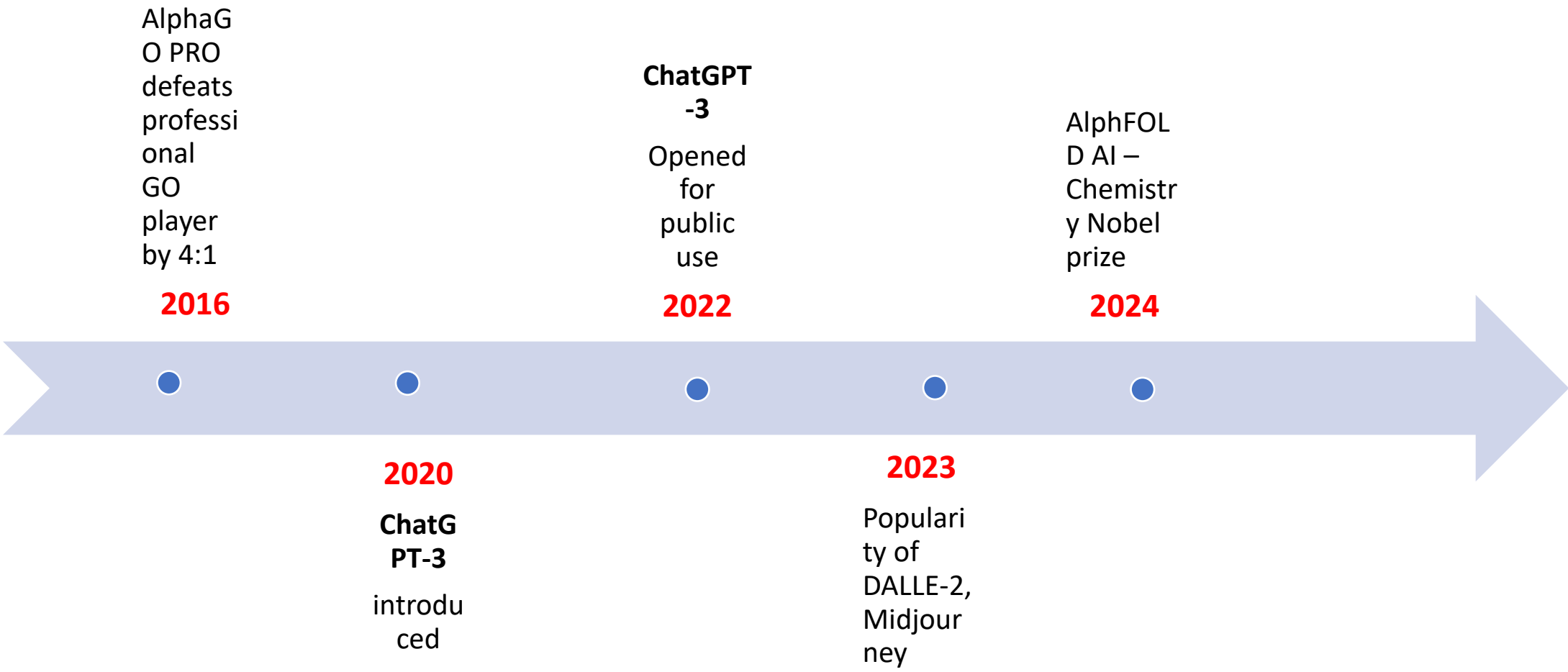
AlexNet rocked the ImageNet competition.

Alex Krizhevsky

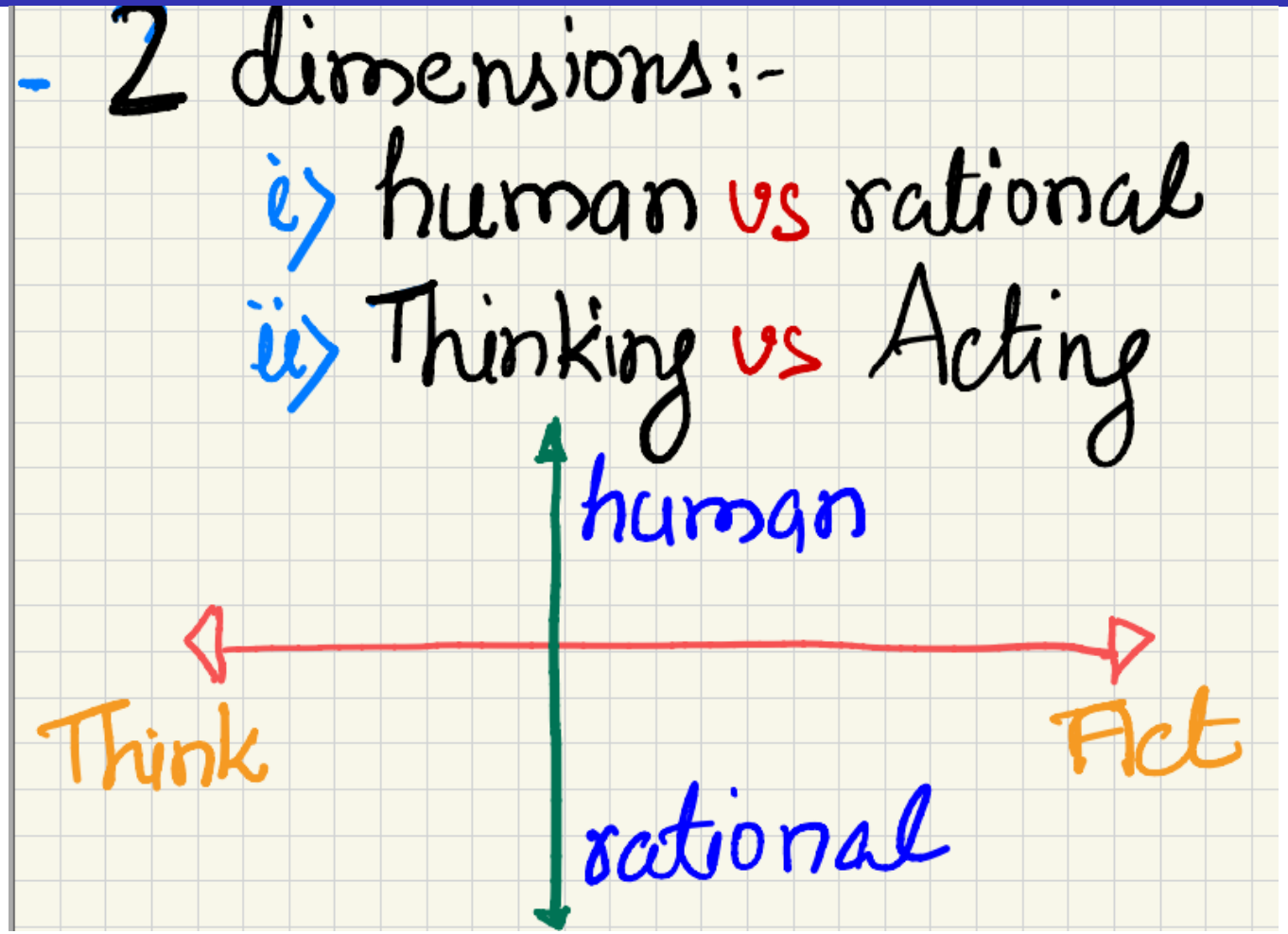
Ilya Sutskever

Hinton

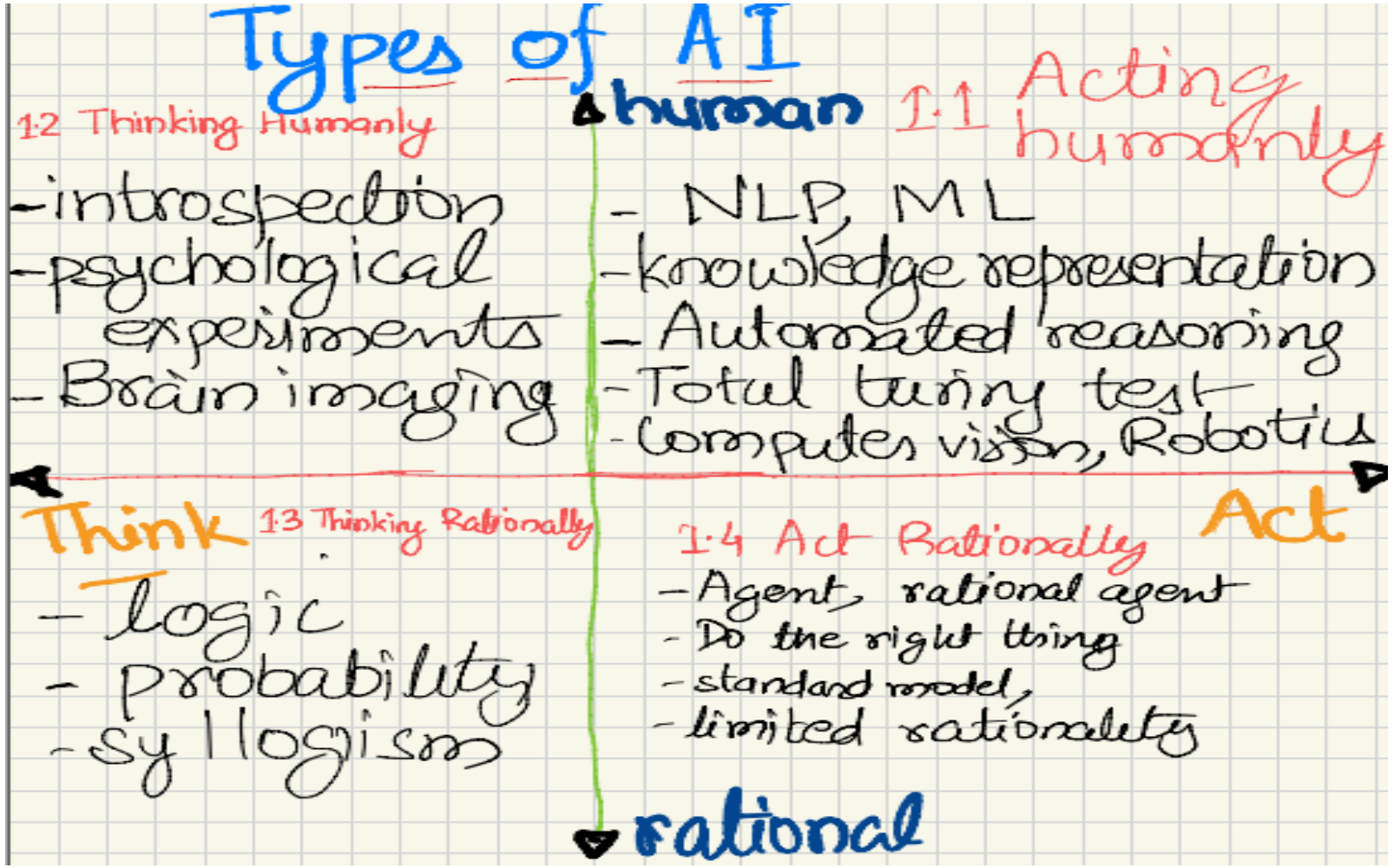
Evolution of AI (History of AI) -3



View of AI


- 2 dimensions:-
i) human vs rational
ii) Thinking vs Acting
human
Think
Act
rational

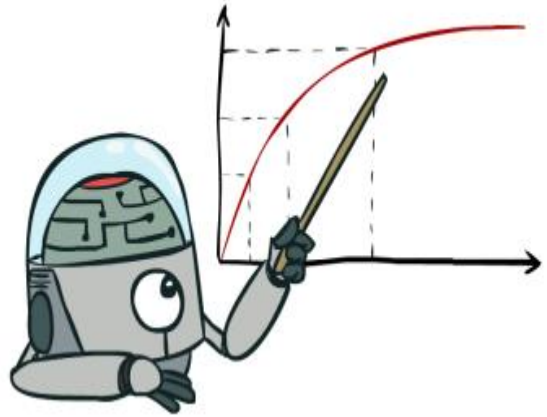
View of AI (Types of AI)



Rational Decisions

- We'll use the term rational in a very specific, technical way:
  - **Rational**: maximally achieving pre-defined goals.
  - Rationality only concerns what decisions are made (not the thought process behind them).
  - Goals are expressed in terms of the utility of outcomes.
  - Being rational means maximizing your expected utility

Maximize your expected **Utility**



What About the Brain?

- Brains (human minds) are very good at making rational decisions, but not perfect.
- Brains aren't as modular as software, so hard to reverse engineer!
- "Brains are to intelligence as wings are to flight".
- Lessons learned from the brain: memory and simulation are key to decision making.

Core subfields of AI

Machine Learning (ML)

Enables systems to learn from data without explicit programming, using algorithms to find patterns.

Deep Learning (DL)

A subset of ML that uses neural networks with multiple layers to model complex patterns in data.

Natural Language Processing (NLP)

Focuses on enabling computers to understand, interpret, and generate human language.

Computer Vision

Allows machines to "see" and interpret visual information from the world, like images and videos.

Expert Systems

AI systems that emulate the decision-making ability of a human expert in a specific domain.

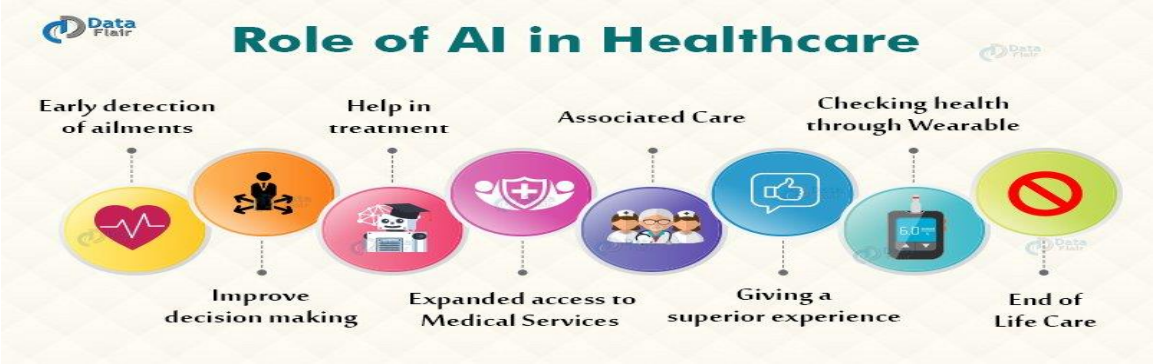
Robotics

Involves the design, construction, operation, and use of robots for automation and physical tasks.

AI applications

AI in Astronomy

- Artificial Intelligence can be very useful to solve complex universe problems. AI technology can be helpful for understanding the universe such as how it works, origin, etc.
- To take on the challenges, astronomers are turning to machine learning and artificial intelligence (AI) to build new tools to rapidly search for the next big breakthroughs.



AI in Healthcare

- In the last, five to ten years, AI becoming more advantageous for the healthcare industry and going to have a significant impact on this industry.
- Healthcare Industries are applying AI to make a better and faster diagnosis than humans. AI can help doctors with diagnoses and can inform when patients are worsening so that medical help can reach to the patient before hospitalization.

AI applications cont…

AI in Gaming

- AI can be used for gaming purpose. The AI machines can play strategic games like chess, where the machine needs to think of a large number of possible places.

AI in Finance

- AI and finance industries are the best matches for each other. The finance industry is implementing automation, Chatbot, adaptive intelligence, algorithm trading, and machine learning into financial processes.

AI applications cont…

AI in Data Security

- The security of data is crucial for every company and cyber-attacks are growing very rapidly in the digital world. AI can be used to make your data more safe and secure. Some examples such as AEG bot, AI2 Platform are used to determine software bug and cyber-attacks in a better way.

AI in Social Media

- Social Media sites such as Facebook, Twitter, and Snapchat contain billions of user profiles, which need to be stored and managed in a very efficient way. AI can organize and manage massive amounts of data. AI can analyze lots of data to identify the latest trends, hashtag, and requirement of different users.

AI applications cont…

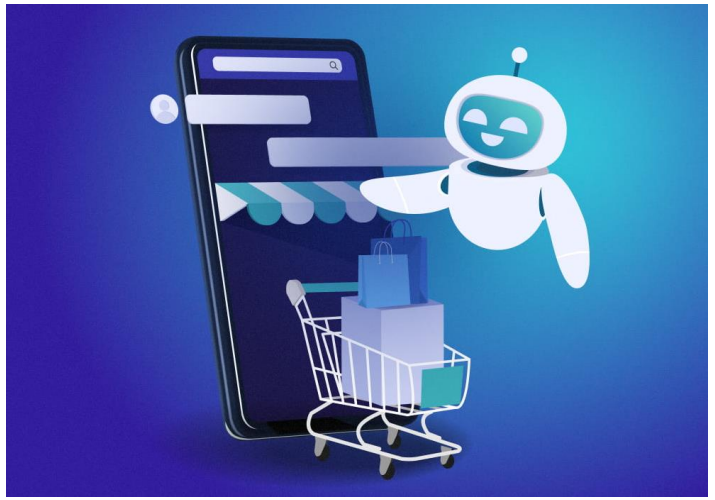
AI in Entertainment

- We are currently using some AI based applications in our daily life with some entertainment services such as Netflix or Amazon. With the help of ML/AI algorithms, these services show the recommendations for programs or shows.

AI in Travel & Transport

- AI is becoming highly demanding for travel industries. AI is capable of doing various travel related works such as from making travel arrangement to suggesting the hotels, flights, and best routes to the customers. Travel industries are using AI-powered chatbots which can make human-like interaction with customers for better and fast response.

AI applications cont…



AI in education

- AI can automate grading so that the tutor can have more time to teach. AI Chatbot can communicate with students as a teaching assistant.
- AI in the future can be work as a personal virtual tutor for students, which will be accessible easily at any time and any place.

AI in E-commerce

- AI is providing a competitive edge to the e-commerce industry, and it is becoming more demanding in the e-commerce business. AI is helping shoppers to discover associated products with recommended size, color, or even brand.

AI applications cont…

AI in Robotics:

- Artificial Intelligence has a remarkable role in Robotics. Usually, general robots are programmed such that they can perform some repetitive task, but with the help of AI, we can create intelligent robots which can perform tasks with their own experiences without pre-programmed.
- Humanoid Robots are best examples for AI in robotics, recently the intelligent Humanoid robot named as Erica and Sophia has been developed which can talk and behave like humans.

Thank you

Questions ?