

Artificial Intelligence (CS303)

Lecture 0: Introduction

Course Information

- Me

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- Lab tutor

- Yao ZHAO (赵耀)

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- Daxin WANG (王大兴)

wangdx3@mail.sustech.edu.cn

- Main reference:

S. Russel & P. Norvig, Artificial Intelligence – A Modern Approach (3rd Edition)

Course Information

 SUSTech Blackboard

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The application for Fall 2024 Blackboard courses is now open. Please submit your request for a Blackboard course site by **clicking on the link** or scan the QR code below and filling out the required information. Thank you!



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▼ 2024秋 (Fall 2024)

在课程中您是: 助教

Artificial Intelligence Fall 2024 (当前不可用)

▶ 2023秋 (Fall 2023)

▶ 2024春 (Spring 2024)

▶ 无规定学期 (N/A)

▼ 我的公告

过去 7 天内未发布任何

过去 7 天内未发布任何课

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Users and Groups

Customization

Instructors

Enabled: Statistics Tracking

Lecturer: Wednesday 14:00-15:50, Lecture Hall, Research Building 1(周三5-6节, 一科报告厅)

Ke Tang(唐珂), tangk3@sustech.edu.cn

Lab:

Group1: Wednesday 16:20-18:10, Room503, Teaching Building 3(周三7-8节, 三教503)

Lab tutor: Xiaofen Lu (陆晓芬), luxf@sustech.edu.cn

Jinyuan Zhang(张晋媛), zhangjy@sustech.edu.cn

SA: Zhiyuan Wang(汪至圆), wangzy2020@mail.sustech.edu.cn

Group2: Wednesday 16:20-18:10, Room505, Teaching Building 3(周三7-8节, 三教505)

Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn

SA: Chunhui Zhang(张春晖), 12332456@mail.sustech.edu.cn

Group3: Friday 10:20-12:10, Room511, Teaching Building 3(周五3-4节, 三教511)

Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn

SA: Yiyang Zhang(张艺严), 12432723@mail.sustech.edu.cn

Group4: Thursday 10:20-12:10, Room501, Teaching Building 3(周四3-4节, 三教501)

Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn

SA: Zide Yang(杨子德), 12432714@mail.sustech.edu.cn

Outline of this lecture

- What is AI? (state-of-the-art, history, etc...)
- What you can (or cannot) expect to learn from this course?
- Course structure and requirements

What is AI?

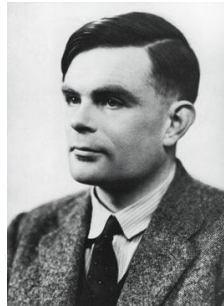
- Which figure is consistent with your imagination about AI?



- All of them can be claimed as AI, while are quite different.

What is AI? – The Origin

- The rough idea of AI can be dated back to 1950, by **Alan Turing** in his paper “**Computing machinery and intelligence**. Mind, 49:433-460, 1950.”



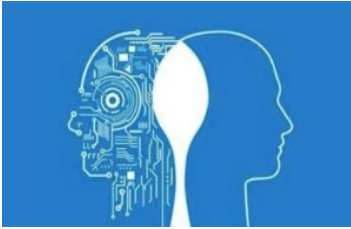
- The **Dartmouth Artificial Intelligence (AI) Conference in 1956**, initiated by **John McCarthy** gave the birth of the AI area.



What is AI? – The Origin

- Most of us believe that human beings are *intelligent*.
- An ambitious question: can the intelligent human beings *build* other entities (agents) that are *at least as intelligent as* we are?
 - What is intelligence and how can we measure it? Sounds like a philosophical question...
 - No unique (neither conclusive) answer.

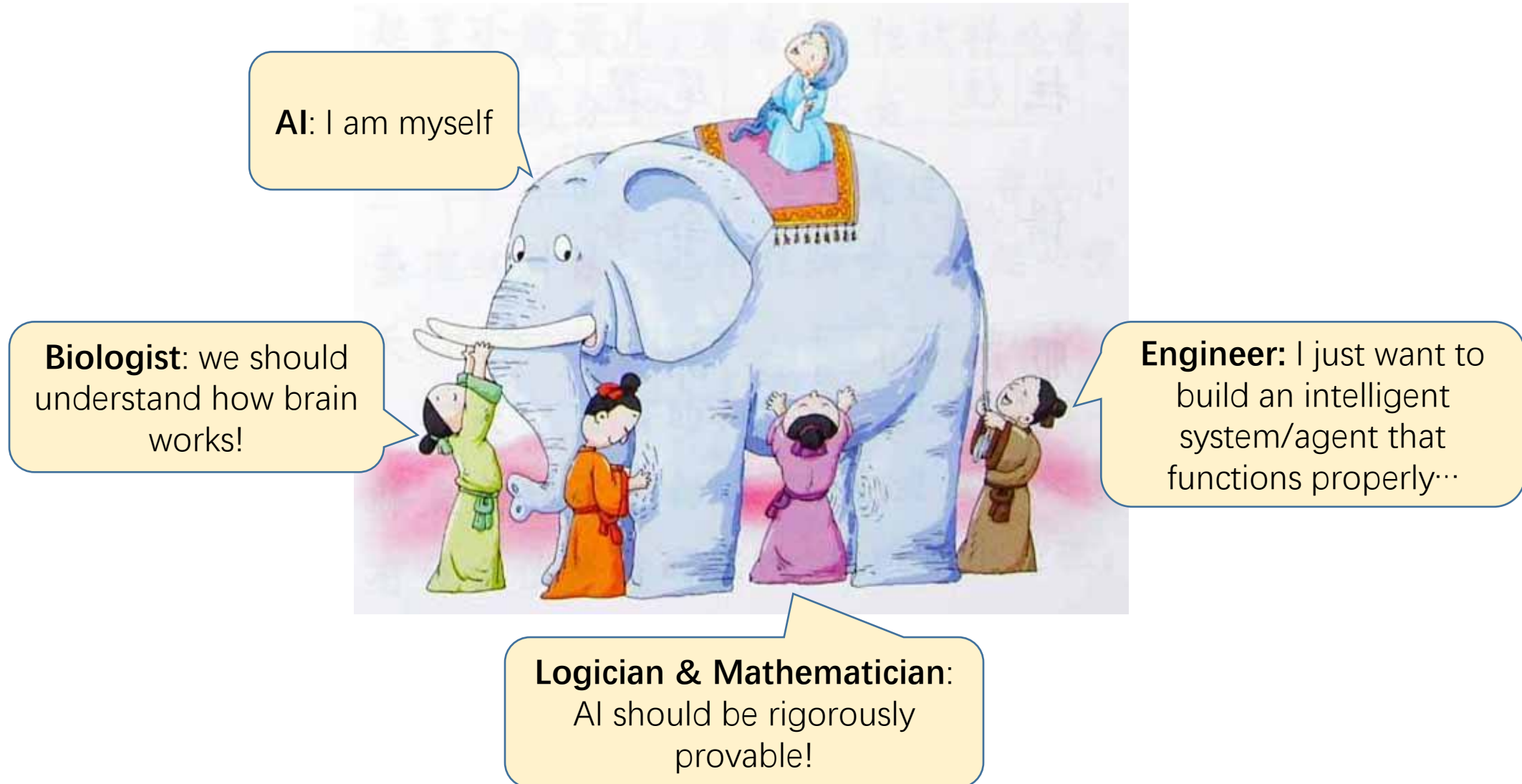
What is AI? – The Origin



Hence, AI is **never** a rigorously defined concept.

Basically, AI is about how to make machines (e.g., computing systems) handle intelligent tasks that could only be handled by human.

Everybody could say something about AI



Everybody could say something about AI



Thinking like a human?

- Intelligent Search
- Machine Learning
- Logical Reasoning

Listening like a human?

- Speech Recognition
- Machine Translation

Seeing like a human?

- Machine Vision
- Autonomous Driving

Acting like a human?

- Walking Control

Everybody could say something about AI

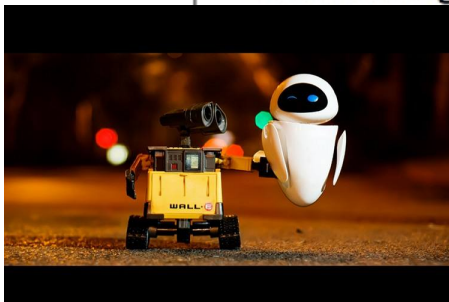
| | |
|---|--|
| Thinking Humanly “The exciting new effort to make computers think . . . <i>machines with minds</i> , in the full and literal sense.” (Haugeland, 1985) “[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning . . .” (Bellman, 1978) | Thinking Rationally “The study of mental faculties through the use of computational models.” (Charniak and McDermott, 1985) “The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992) |
| Acting Humanly “The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990) “The study of how to make computers do things at which, at the moment, people are better.” (Rich and Knight, 1991) | Acting Rationally “Computational Intelligence is the study of the design of intelligent agents.” (Poole <i>et al.</i> , 1998) “AI . . . is concerned with intelligent behavior in artifacts.” (Nilsson, 1998) |

Everybody could say something about AI

Thinking Humanly

“The exciting new effort to make computers with minds, in the full sense.” (Haugeland, 1985)

“The study of the [imitation of] activities that we call human thinking, activities such as perception, learning, problem solving, learning ...” (Bellman, 1978)



Thinking Rationally

“The study of methods for the use of computational models to solve problems that require common sense.” (Charniak and McMillan, 1985)

“The study of the formal logic that underlies intelligent behavior. It seeks to represent knowledge as a formal logic and use this representation to solve a wide class of problems. It is concerned with it possible to perceive the world and to act rationally.” (Winston, 1992)



Acting Humanly

“The study of machines that perform tasks that require intelligence as they are done by people.” (Kurzweil, 1990)

“How to make computers do what we call intelligent behavior. At the moment, people are the only machines that do this. (Edsall and Knight, 1991)



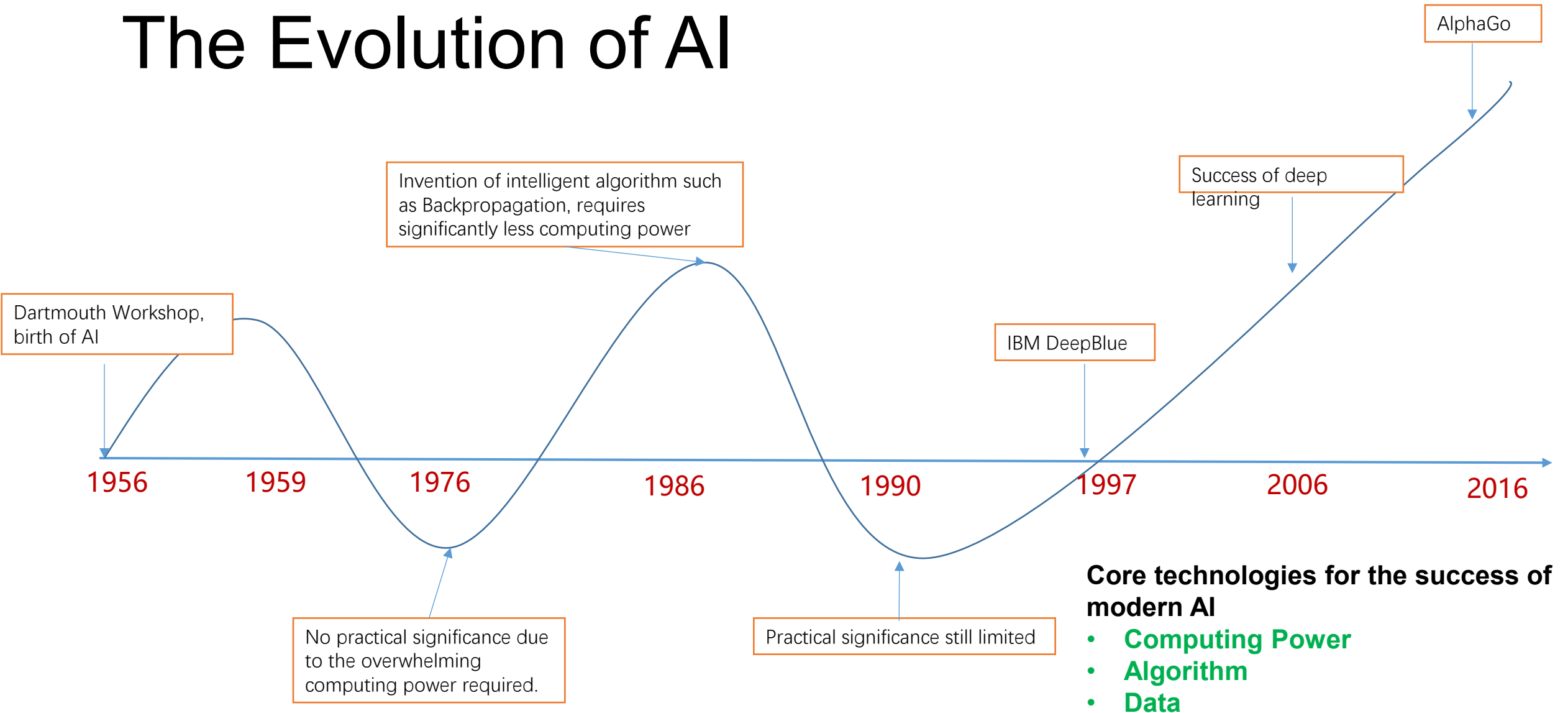
Acting Rationally

“Computational Intelligence is the study of the design of intelligent behavior.” (Hollnagel et al., 1998)

“AI ... is concerned with the design of behavior in artifacts.” (Winston, 1992)

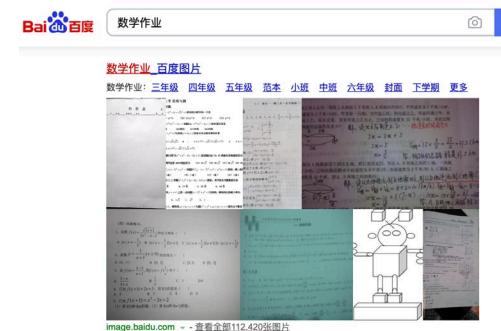
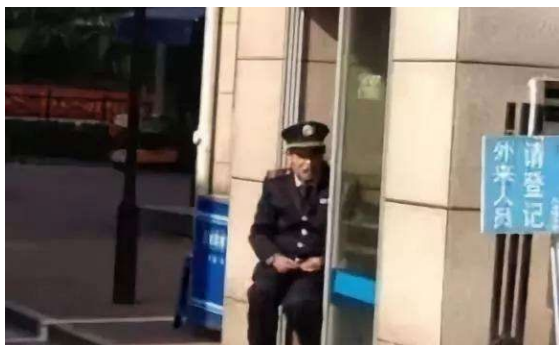


The Evolution of AI



Why is AI **hot** again?

- Making our life easier (more convenient)



Why should I Learn an AI course?

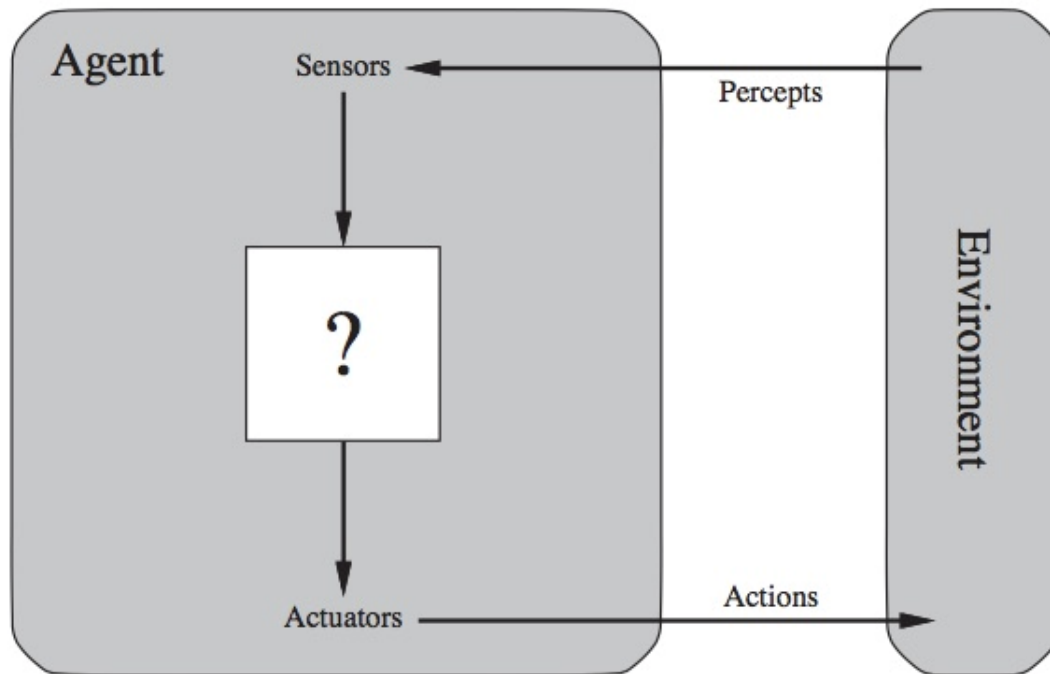
- The university/department require me to learn...
- To seek a job – I can build a super-good AI system!
- It is likely that I'll have to interact/evolve with AI systems for my whole life.

What's THIS course about?

- We take the engineering perspective.
- We concern building **computing systems** for **applications** that needs **some level of intelligence**.

What's THIS course about?

- The term “**Agent**” might be the very first concept for AI.



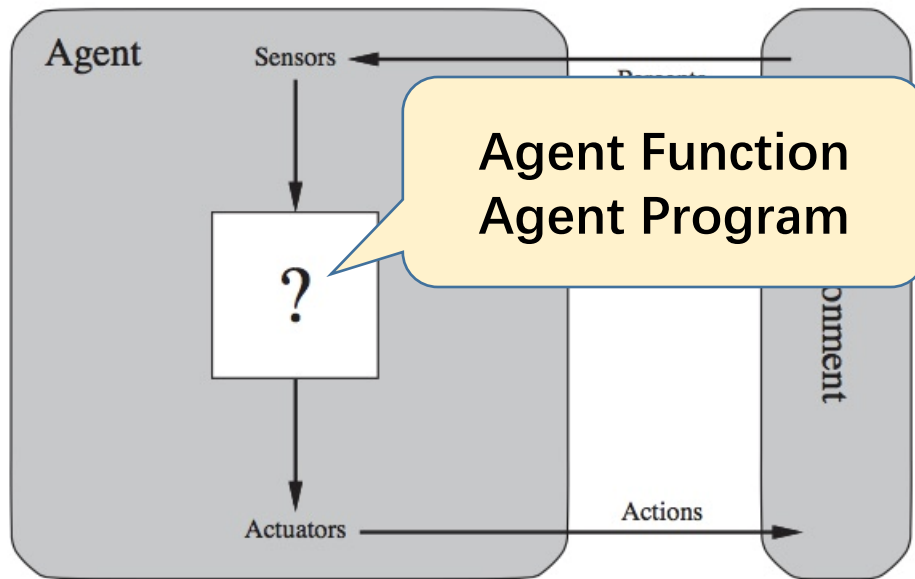
For human

- Sensors: eye, ears
- Actuators: hand/leg...
- ?: brain

What's THIS course about?

- Agent is an abstract concept, it can be everything, similar to a point (object) in a high school physics textbook.
- Agent is the most basic terminology, as well as the entity to investigate, in many classical AI literature.
- Recently, different sub-areas of AI have started using more domain-specific terminology, rather than agent, e.g., “*learner*” in machine learning.

What's THIS course about?

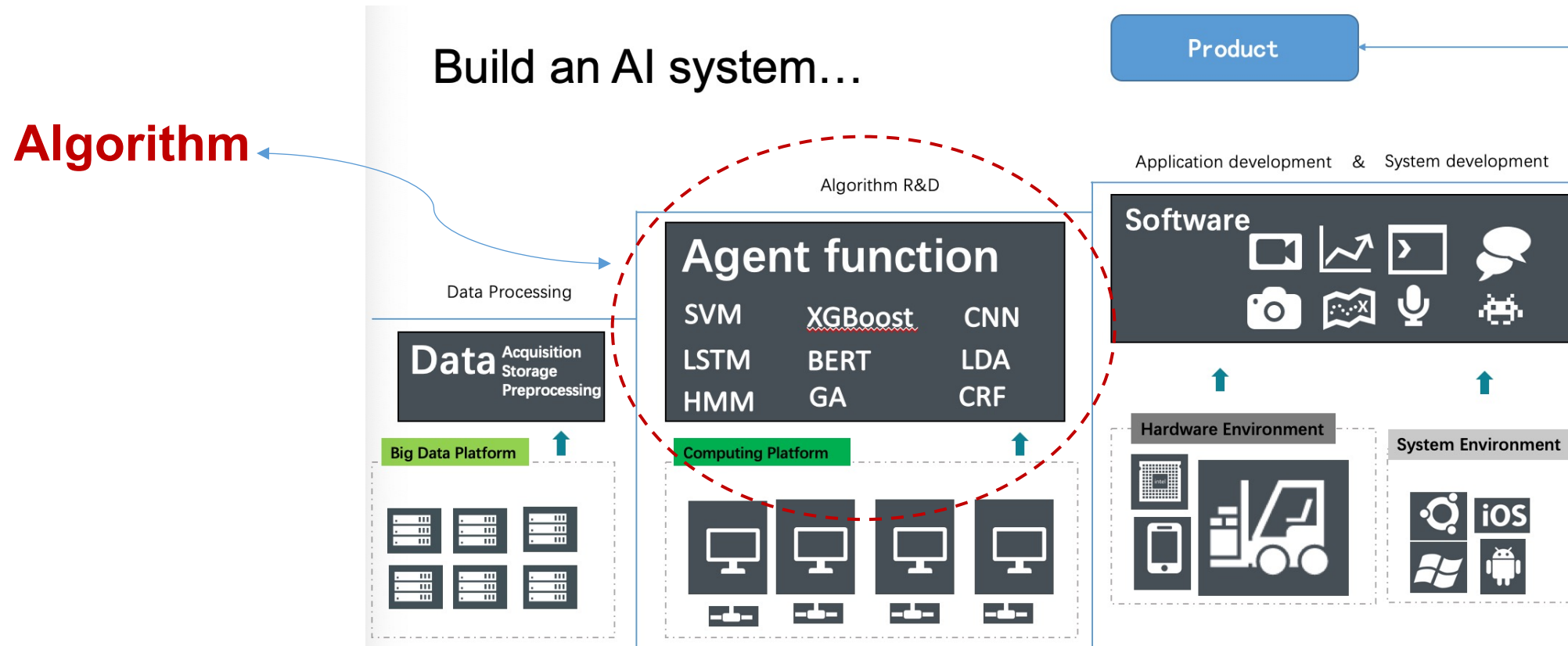


$$F_9(\mathbf{x}) = \sum_{i=1}^D (z_i^2 - 10 \cos(2\pi z_i) + 10) \quad \text{Function}$$

- From the CS viewpoint, an agent's behavior is **described (mathematically)** by the agent function that maps any given percept sequence to an action.

What's THIS course about?

- In a nutshell, this course introduce **how to design various agent functions.**



Course Structure

Lectures: 3 sections

- Problem Solving: AI as *search*
- Learning: *gain experience/knowledge* from data
- Knowledge and Reasoning: represent human knowledge *logically*.

Projects: 3 near-industry/academia-level projects

Course Requirements - General

- Final Score depends on:
 - final-exam: 40 points
 - Homework + attendance: 15 points
 - 3 Projects: 45 points
- Please **do not negotiate** for more scores (no matter for what reason), unless we make a mistake in calculating your scores.
- Please join the Blackboard site of this course.
- Note: Homework and the 3 projects are **crucial**.
 - e.g., if you never attend and submit only 1 out of 3 projects, you probably will fail.

Course Requirements - Projects

- We can elaborate on the project requirements in lab, but will **not** write a program for you.
- Please finish the 3 projects **independently** (good chance to practice/prepare for your postgraduate study or job).
- Project report/program submitted **after the deadline** will be **marked 0**.
- Discussions and sharing are encouraged, but duplicated submissions, either program or report, will be **marked 0** for all involved submissions.

To be continued