

Artificial Intelligence (CS303)

Lecture 0: Introduction

Course Information

- Me

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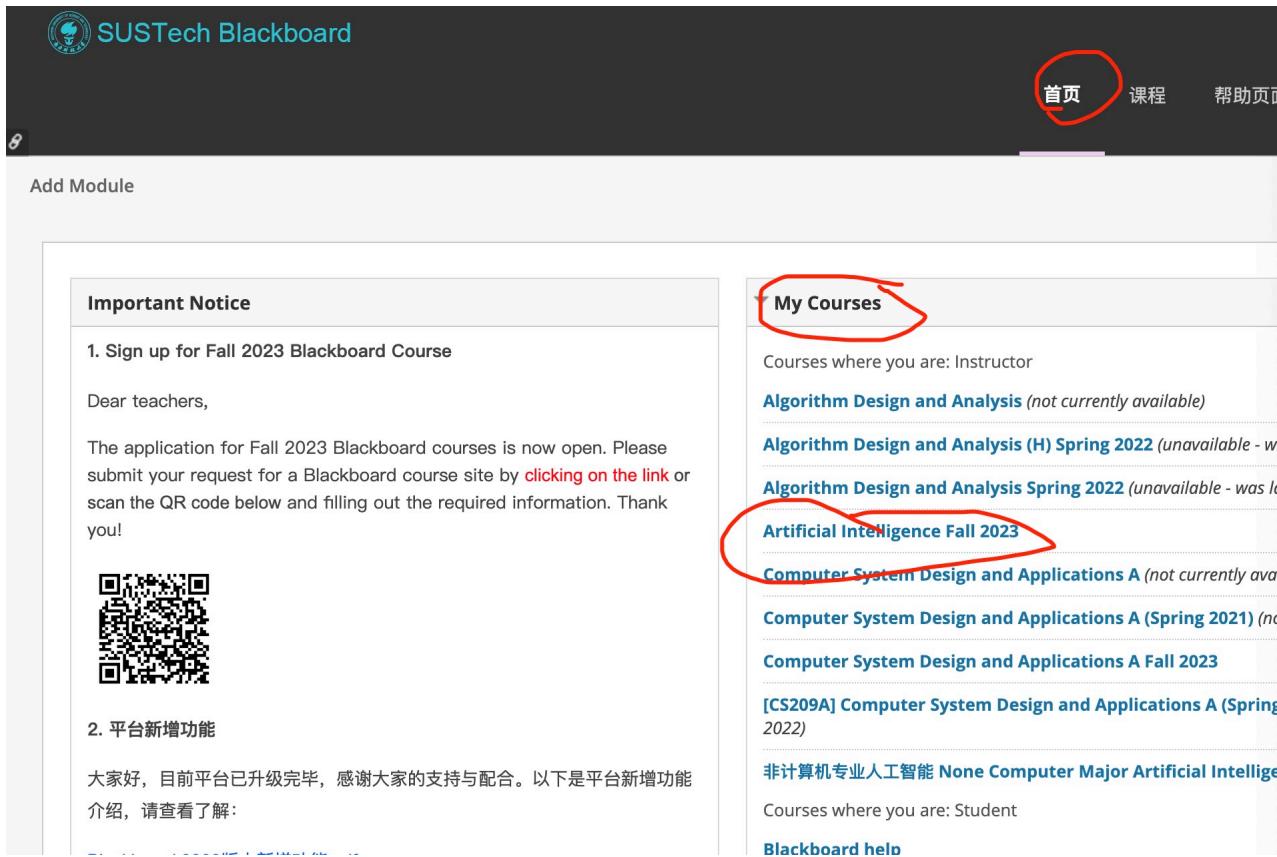
<https://faculty.sustech.edu.cn/tangk3/>

- Main reference:

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

Please do **not** expect **immediate** response from us, although we will do our best to support your study as much as possible.

Course Information



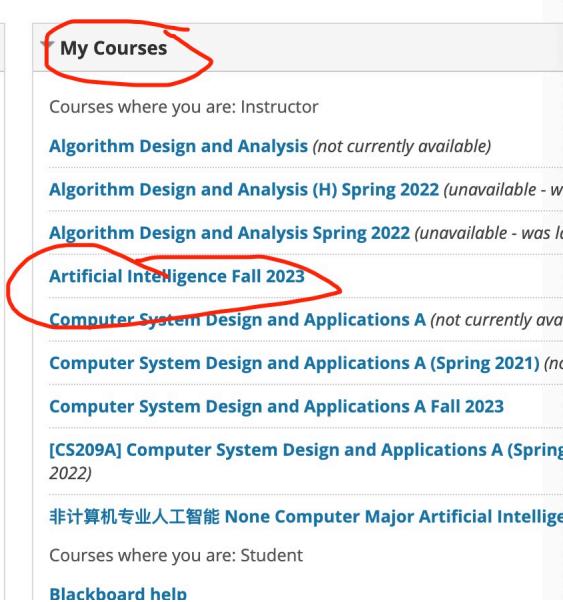
The screenshot shows the SUSTech Blackboard homepage. At the top, there's a navigation bar with '首页' (Home), '课程' (Courses), and '帮助页面' (Help Page). Below the navigation is a section titled 'Important Notice' with the following content:

1. Sign up for Fall 2023 Blackboard Course

Dear teachers,
The application for Fall 2023 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!
2. 平台新增功能

大家好，目前平台已升级完毕，感谢大家的支持与配合。以下是平台新增功能介绍，请查看了解：

On the right side, there's a QR code and a 'Blackboard help' link.

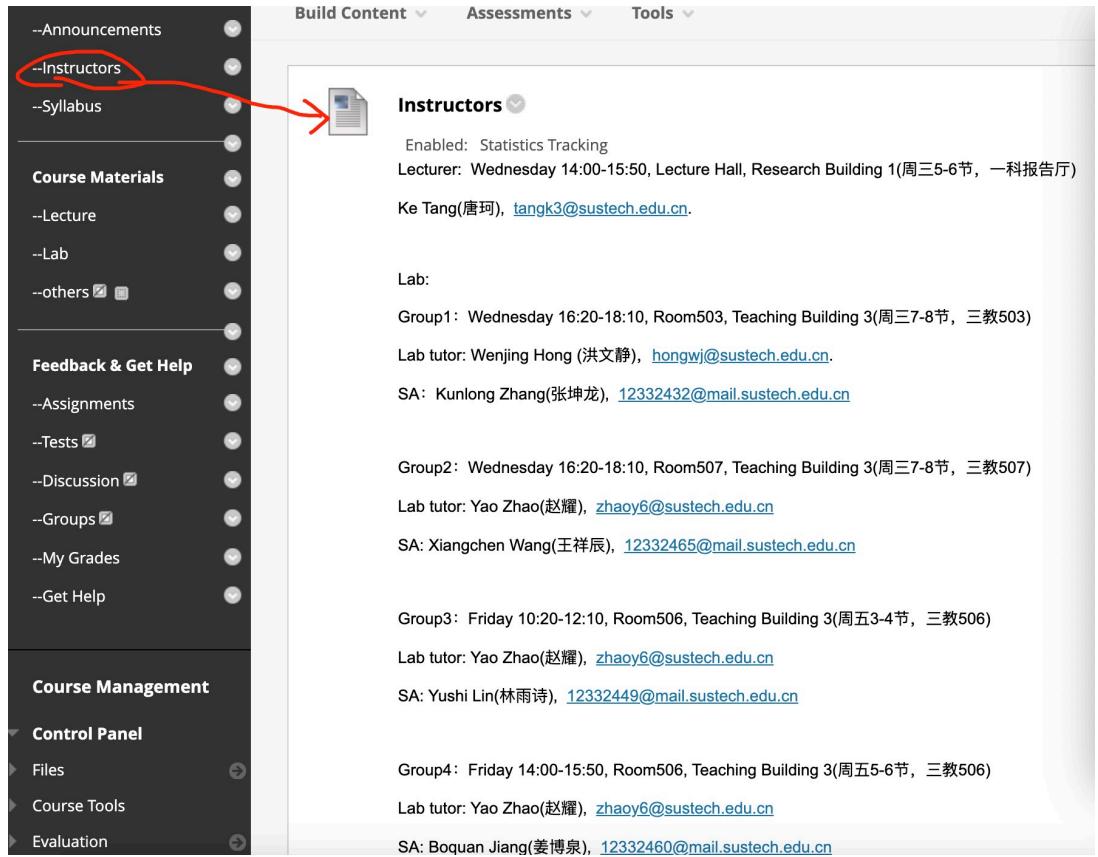


The 'My Courses' page lists several courses where the user is an instructor:

- Algorithm Design and Analysis (not currently available)
- Algorithm Design and Analysis (H) Spring 2022 (unavailable - was last taught in 2021)
- Algorithm Design and Analysis Spring 2022 (unavailable - was last taught in 2021)
- Artificial Intelligence Fall 2023
- Computer System Design and Applications A (not currently available)
- Computer System Design and Applications A (Spring 2021) (not available)
- Computer System Design and Applications A Fall 2023
- [CS209A] Computer System Design and Applications A (Spring 2022)
- 非计算机专业人工智能 None Computer Major Artificial Intelligence

Courses where the user is a student are listed at the bottom:

- Blackboard help



The 'Instructors' page displays information for four groups of students:

- Group 1:** Wednesday 14:00-15:50, Lecture Hall, Research Building 1 (周三5-6节, 一科报告厅)
Lecturer: Ke Tang(唐珂), tangk3@sustech.edu.cn.
Lab tutor: Wenjing Hong (洪文静), hongwj@sustech.edu.cn.
SA: Kunlong Zhang(张坤龙), 12332432@mail.sustech.edu.cn.
- Group 2:** Wednesday 16:20-18:10, Room 503, Teaching Building 3 (周三7-8节, 三教503)
Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn.
SA: Xiangchen Wang(王祥辰), 12332465@mail.sustech.edu.cn.
- Group 3:** Friday 10:20-12:10, Room 506, Teaching Building 3 (周五3-4节, 三教506)
Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn.
SA: Yushi Lin(林雨诗), 12332449@mail.sustech.edu.cn.
- Group 4:** Friday 14:00-15:50, Room 506, Teaching Building 3 (周五5-6节, 三教506)
Lab tutor: Yao Zhao(赵耀), zhaoy6@sustech.edu.cn.
SA: Boquan Jiang(姜博泉), 12332460@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?

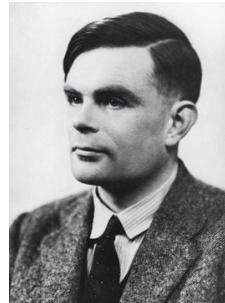
- Which figure is consistent with your imagination about AI?



- 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.”



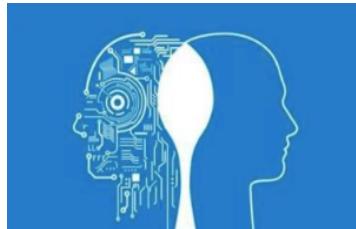
- The **Dartmouth Artificial Intelligence (AI) Conference in 1956**, initiated by **John McCarthy** gave the birth of the AI area.



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.

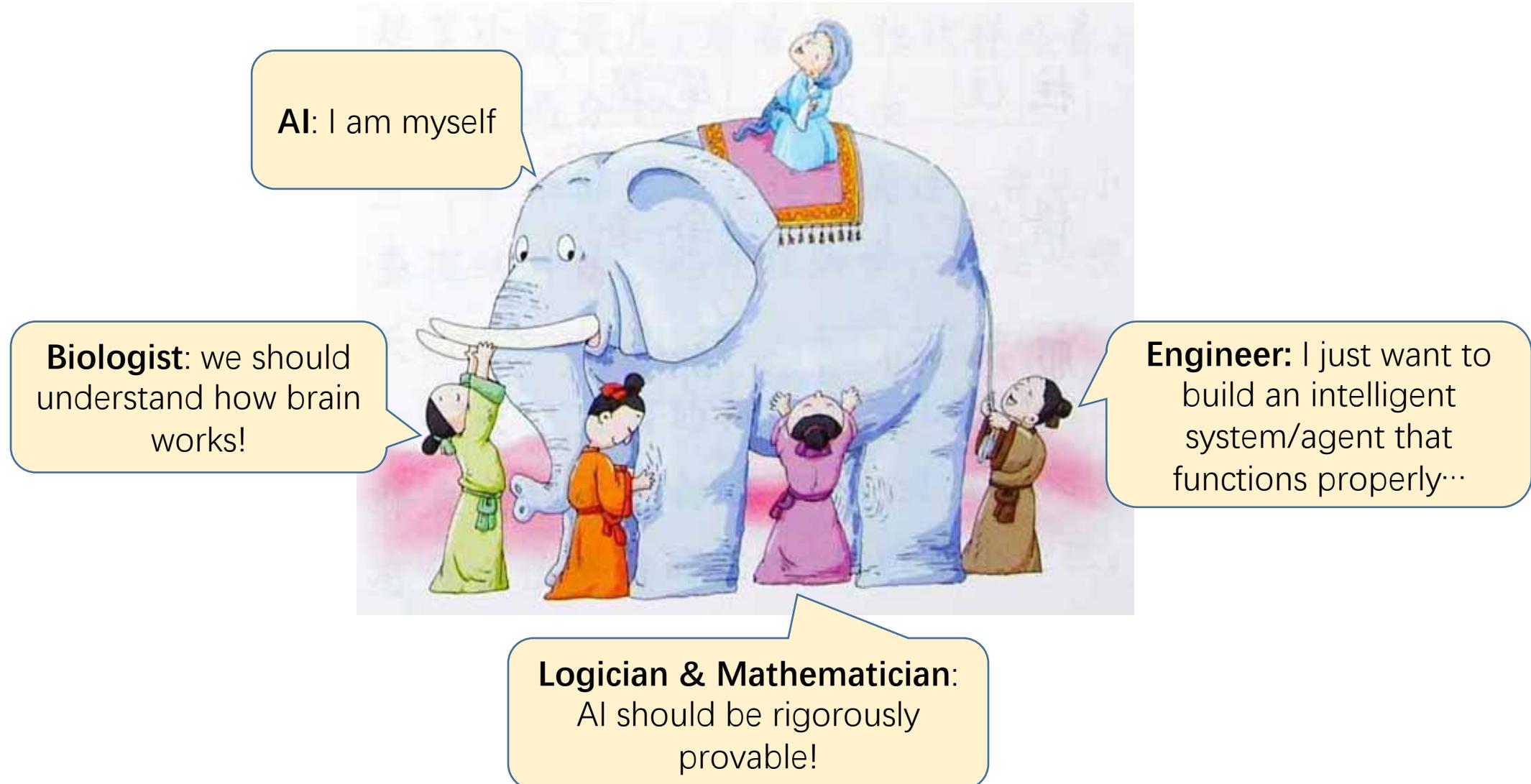
What is AI? – The Origin



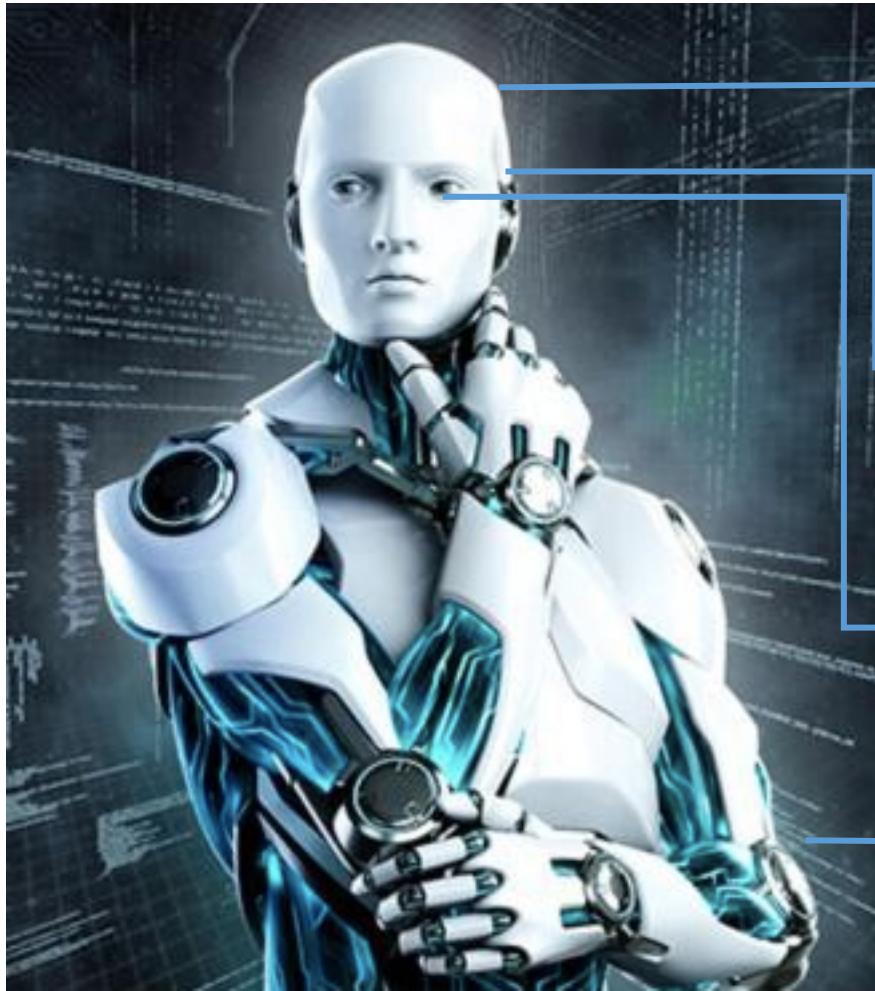
Hence, AI is **never** a rigorously defined concept.

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

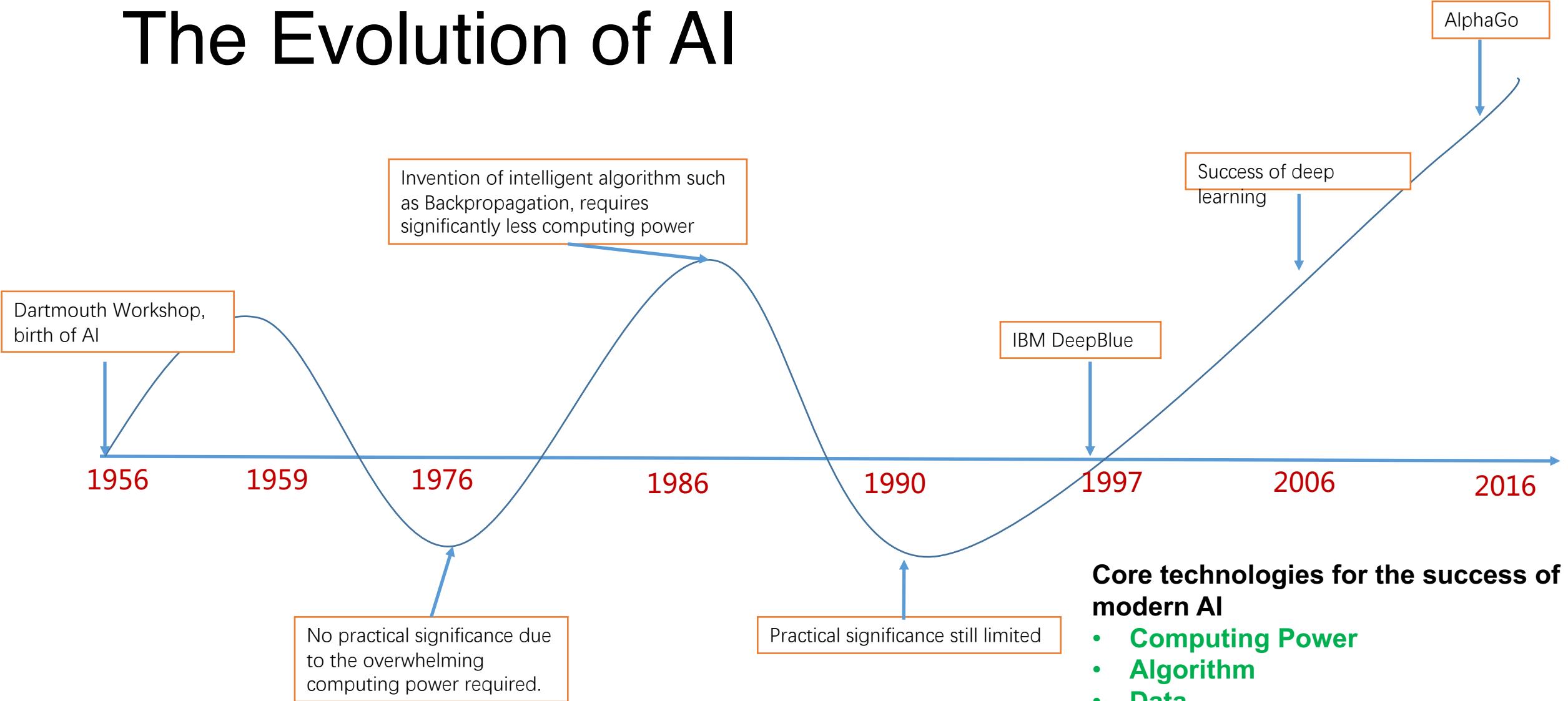
Everybody could say something about AI

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

Everybody could say something about AI

Thinking Humanly “The exciting new effort to make computers think like machines with minds, in the usual sense.” (Haugeland, 1985)  “...the simulation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning, learning ...” (Bellman, 1978)	Thinking Rationally “The study of methods for making effective use of computation to solve problems” (Charniak and McDermott, 1985) “The study of the principles that make it possible to perceive, reason, and act” (Winston, 1992) 
Acting Humanly “Computational models of acting machines that perform tasks that require intelligence without being controlled by people.” (Kurzweil, 1990)  “...how to make computers do what we want them to do at the moment, people are interested in that.” (Knight, 1991)	Acting Rationally “Computational models of the design of intelligent systems” (Marr et al., 1998) “AI ... is concerned with the behavior of artifacts.” (Holland, 1992) 

The Evolution of AI



Why is AI **hot** again?

- Making our life easier (more convenient)



Why should I Learn an AI course?

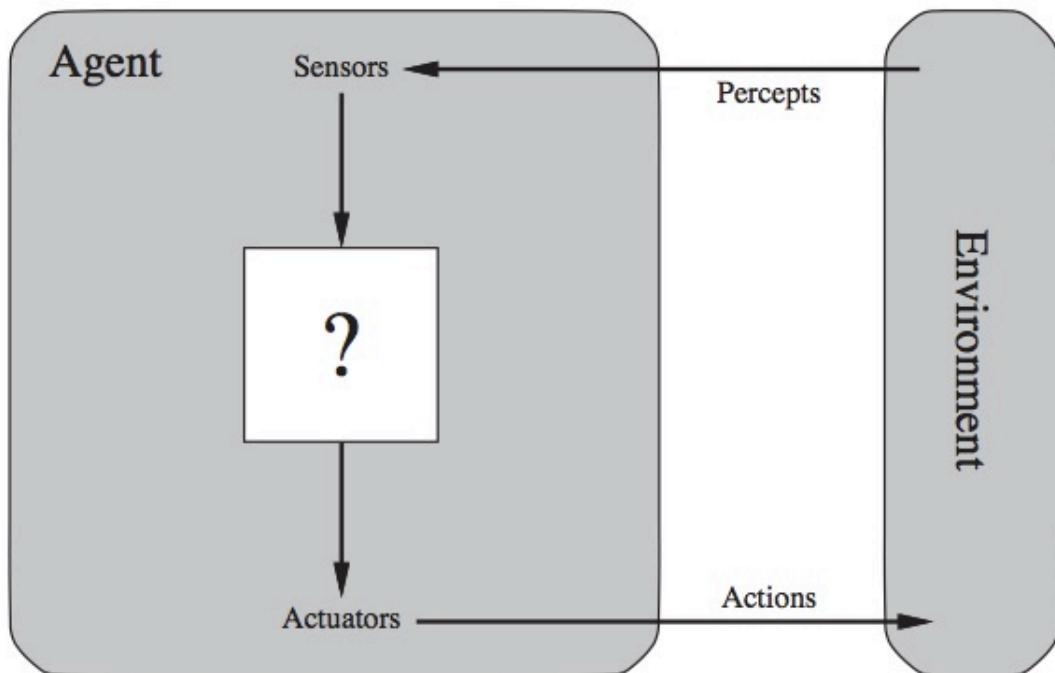
- The university/department require me to learn...
- To seek a job – I can build a super-good AI system!
- It is likely that I'll have to interact/evolve with AI systems for my whole life.

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.



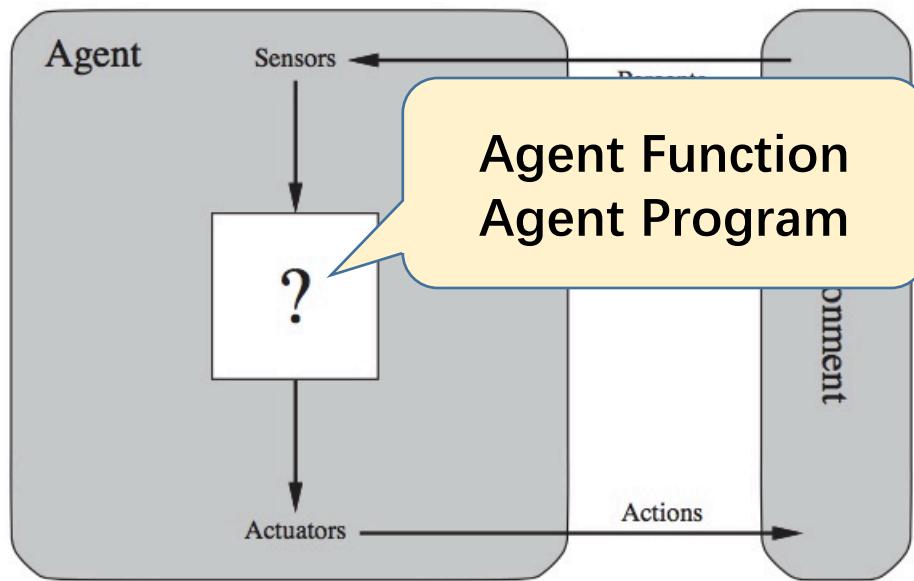
For human

- 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?



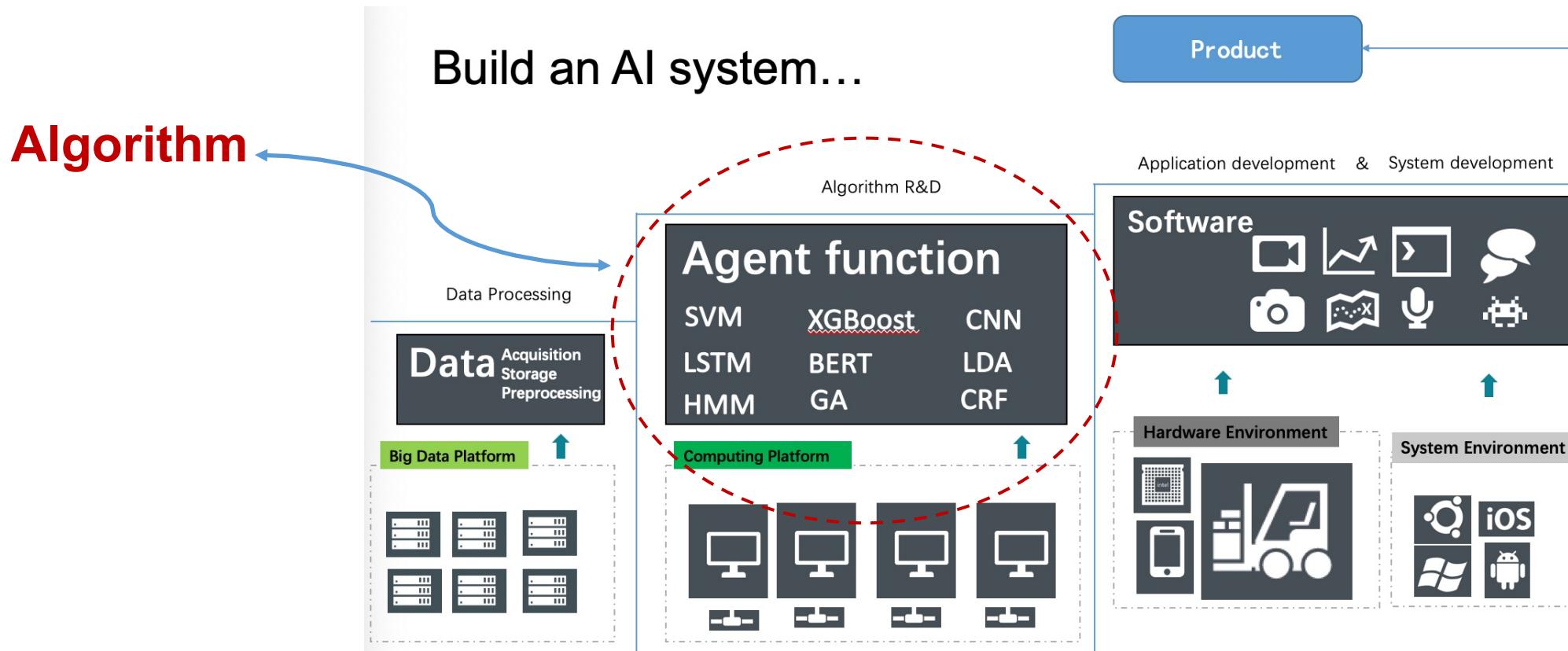
$$F_9(\mathbf{x}) = \sum_{i=1}^D (z_i^2 - 10 \cos(2\pi z_i) + 10)$$

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