CS 103 -02

AI Concept

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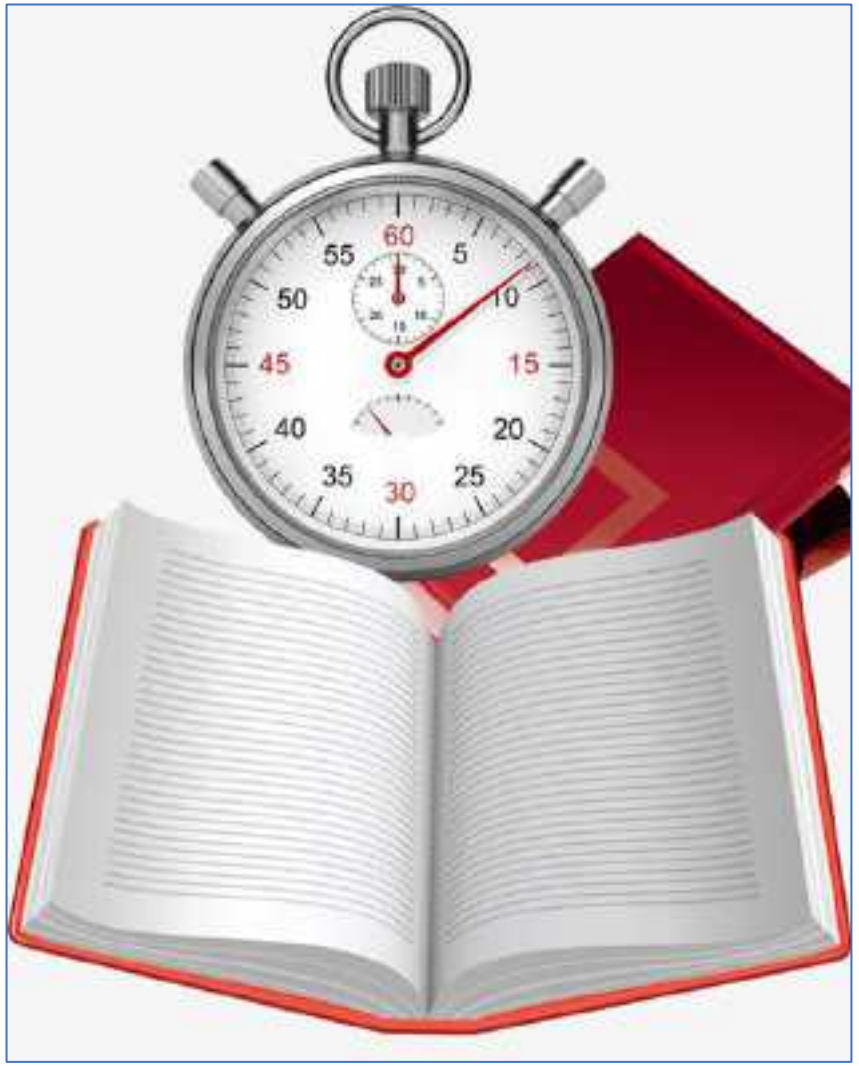
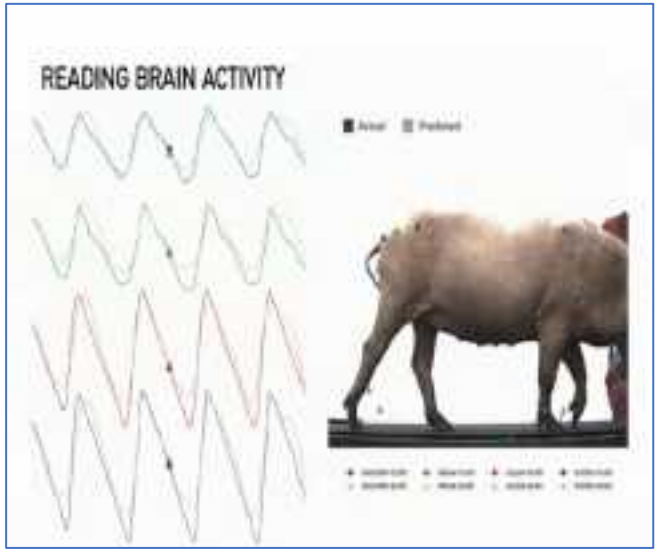
2020-09-18

Lecture 01 Review



AI around US



Class Study Methods

Active learning: It is about how much you think and learn

Collective study: Let us study together

Active Learning AI Around YOU – Class 1

Skynet 是一个基于C跟lua的开源服务端并发框架，这个框架是单进程多线程模型，使用skynet 节点，通过master，认识网络中所有其它 skynet 节点，它们相互一一建立单向通讯通道。

skynet是我们游戏服务端的底层框架，当初在技术选型的时候仔细阅读过它的源码，发现它是一个C语言的工程典范。大多数游戏服务端，要么使用C++，要么使用java，使用C是非常少见的。但是skynet通过C和Lua的结合，实现了一个高效的游戏框架，C层没有多余的一堆三方库，只有紧凑的核心结构，提供最核心的消息处理框架；Lua层用来写游戏逻辑，降低了开发门槛。

Active Learning AI Around YOU – Class 2

Active Learning AI Around YOU – Class 2

小冰

数据分析

自动驾驶

语音识别

微软小娜

支付宝人脸识别

特斯拉

tabnine 是个代码人工智能自动补全软件

到底啥是GPT-3?

GPT-3 是著名人工智能科研公司 OpenAI 开发的文字生成 (text generation) 人工智能，相关论文5月份已经发表，当时就以天文数字级别的1,750亿参数量引发轰动。

不过直到最近，公众才真正见识到它到底有多厉害……到底发生了什么？

原来，OpenAI 这次一反之前死守基础研究的思路，将 GPT-3 做成了一个服务，提供可以调用的 OpenAI API，并且向开放了少量体验资格，学术机构、商业公司和个人开发者都可以申请……

人工智能-GPT-3

尚学堂人工智能学院

OpenAI在最近， 新提出的 GPT-3 在网络媒体上引起啦的热议。因为它的参数量要比 2 月份刚刚推出的、全球最大深度学习模型 Turing NLP 大上十倍，而且不仅可以更好地答题、翻译、写文章，还带有一些数学计算的能力。这样强大的深度学习，不禁让人产生一种错觉：真正的 AI 要来了吗？

Active Learning AI Around YOU – Class 2

首先，GPT-3 最令人惊讶的还是模型体量，它使用的最大数据集在处理前容量达到了 45TB。根据 OpenAI 的算力统计单位 petaflops/s-days，训练 AlphaGoZero 需要 1800-2000pfs-day，而 OpenAI 刚刚提出的 GPT-3 用了 3640pfs-day。

研究者们希望 GPT-3 能够成为更通用化的 NLP 模型，解决当前 BERT 等模型的两个不足之处：对领域内有标记数据的过分依赖，以及对于领域数据分布的过拟合。GPT-3 致力于能够使用更少的特定领域，不做 fine-tuning 解决问题。

Cortana

由微软开发的人工智能助理

微软小娜 一般指本词条

本词条是多义词，共2个义项

Cortana （中文名：微软小娜）是微软发布的全球第一款个人智能助理，它"能够了解用户的喜好和习惯"，助用户进行日程安排、问题回答等"。[1]Cortana 可以说是微软在机器学习和人工智能领域方面的尝试。微

Active Learning AI Around YOU – Class 2

达芬奇机器人手术系统以麻省理工学院(原名斯坦福研究学院)研发的机器人外科手术技术为基础。Intuitive Surgical随后与IBM、麻省理工学院和Heartport公司联手对该系统进行了进一步开发。FDA已经批准将达芬奇机器人手术系统用于成人和儿童的普通外科、胸外科、泌尿外科、妇产科、头颈外科以及心脏手术。达芬奇外科手术系统是一种高级机器人平台，其设计的理念是通过使用微创的方法，实施复杂的外科手术。

Active Learning AI Around YOU – Class 2

Lecture 01 Review – Detail Syllabus

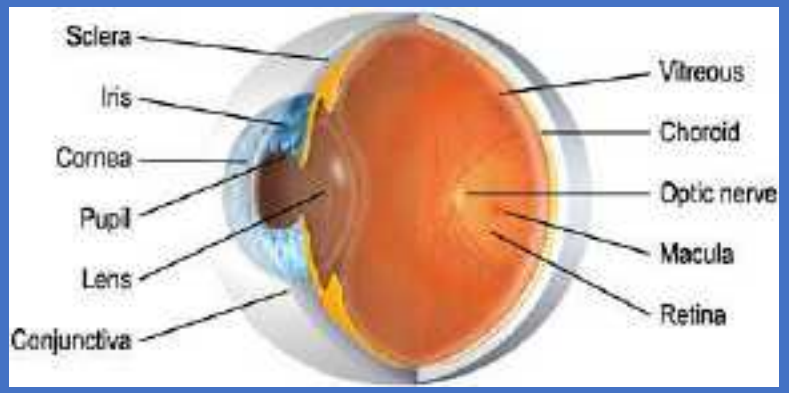
第一阶段： 人工智能理论概述

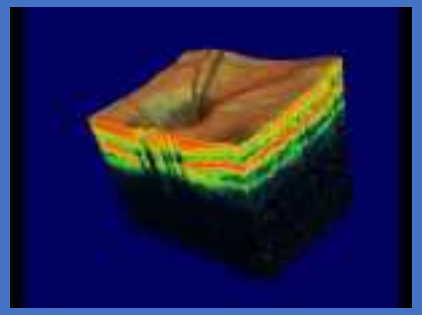
- 第一部分：人工智能的定义和研究与应用热点
- 第二部分：前期人工智能及其神经生物学科学基础
- 第三部分：Perceptron 和早期人工智能算法
- 第四部分：XOR问题与多层神经元网络结构
- 第五部分：人工智能知识空间与知识图谱
- 第六部分：人工智能搜索算法
- 第七部分：人工智能语言、Python，机器学习和深度学习框架和平台
- 第八部分：人工智能应用与行业专家课堂分享

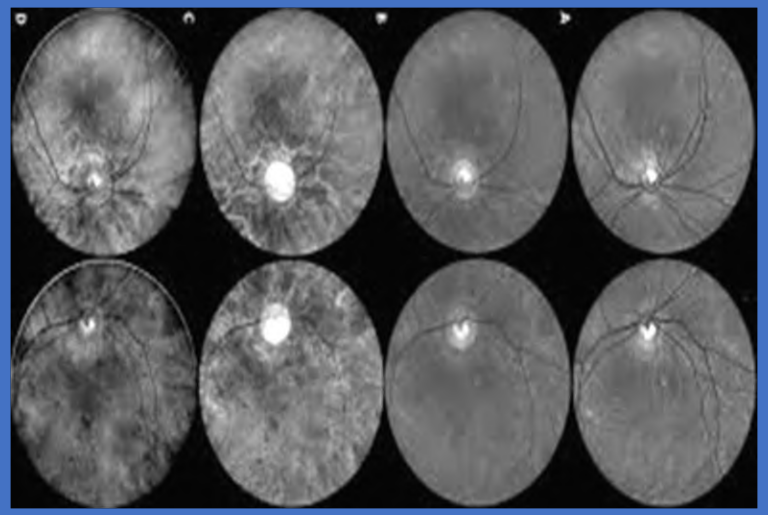
第二阶段： 机器学习，深度学习算法及人工智能应用系统

- 第九部分：人工智能机器学习算法
- 第十部分：反向传播人工神经元网络BP与支持向量机SVM
- 第十一部分：深度学习卷积神经元网络
- 第十二部分：人工智能算法与大数据
- 第十三部分：人工智能算法与计算机视觉及图像
- 第十四部分：人工智能算法与语音识别和处理
- 第十五部分：人工智能算法与视频分析
- 第十六部分：人工智能前沿热点与行业专家课堂分享

Lecture 01 Review – Ocular AI

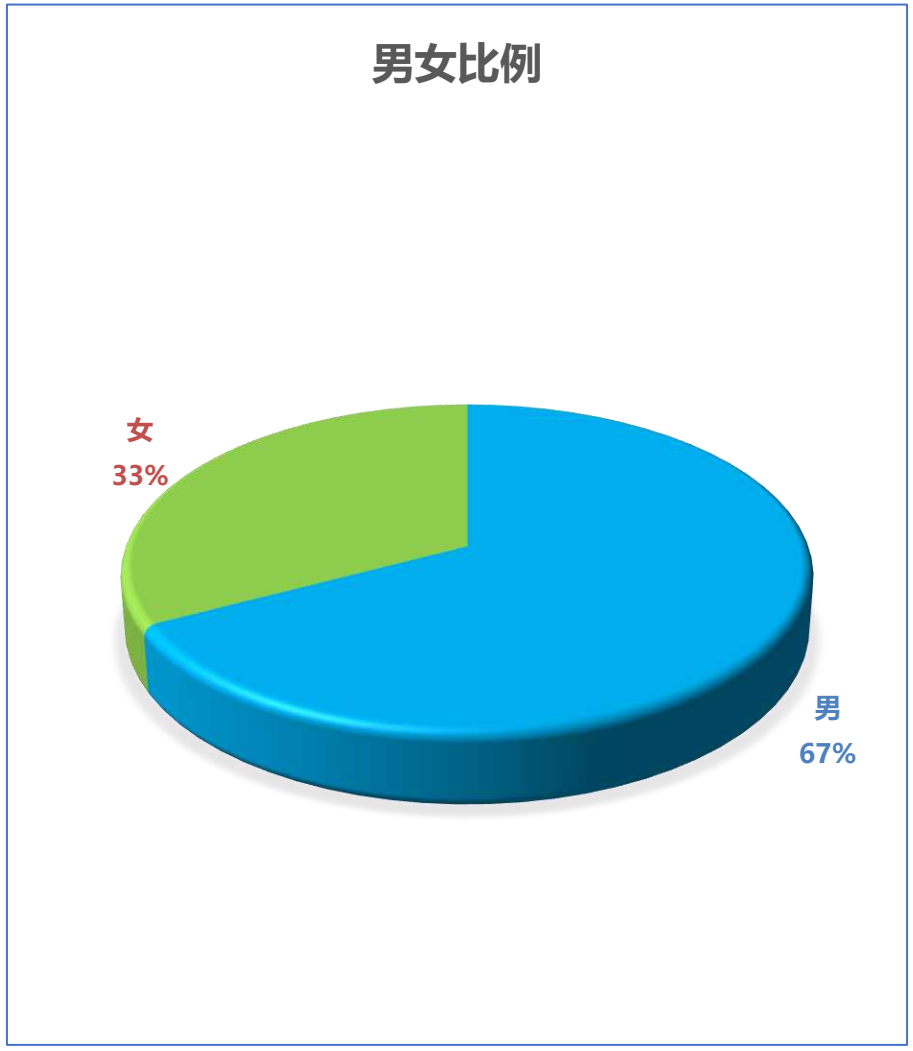


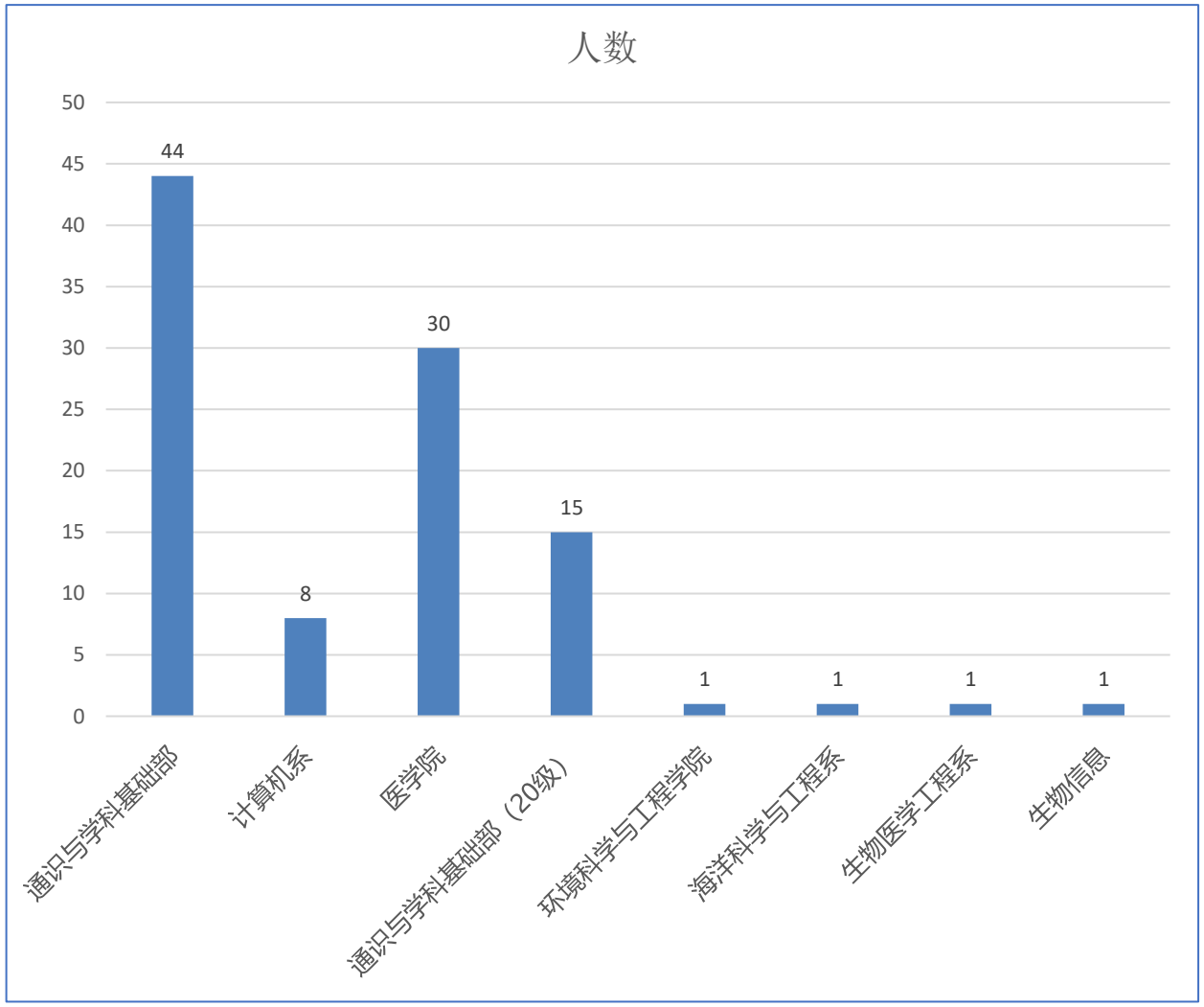




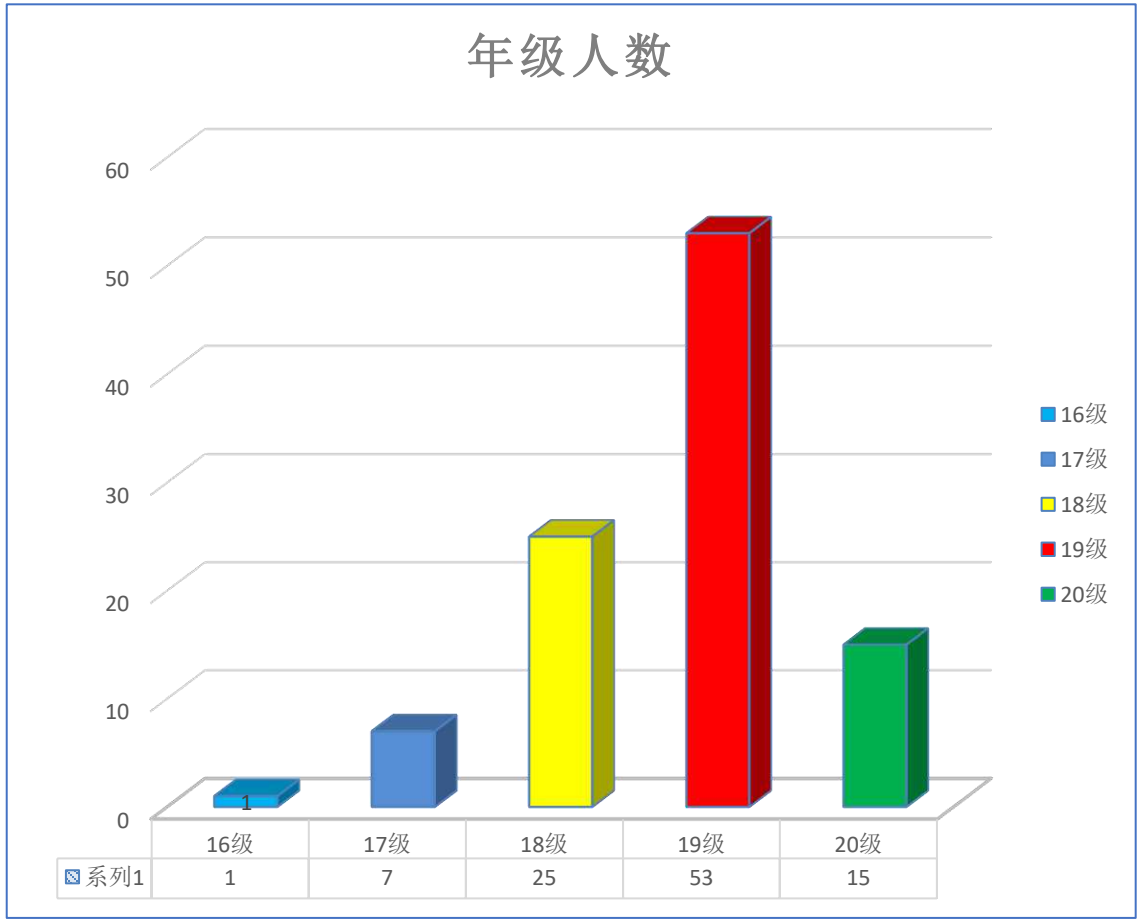
www.imed-lab.com

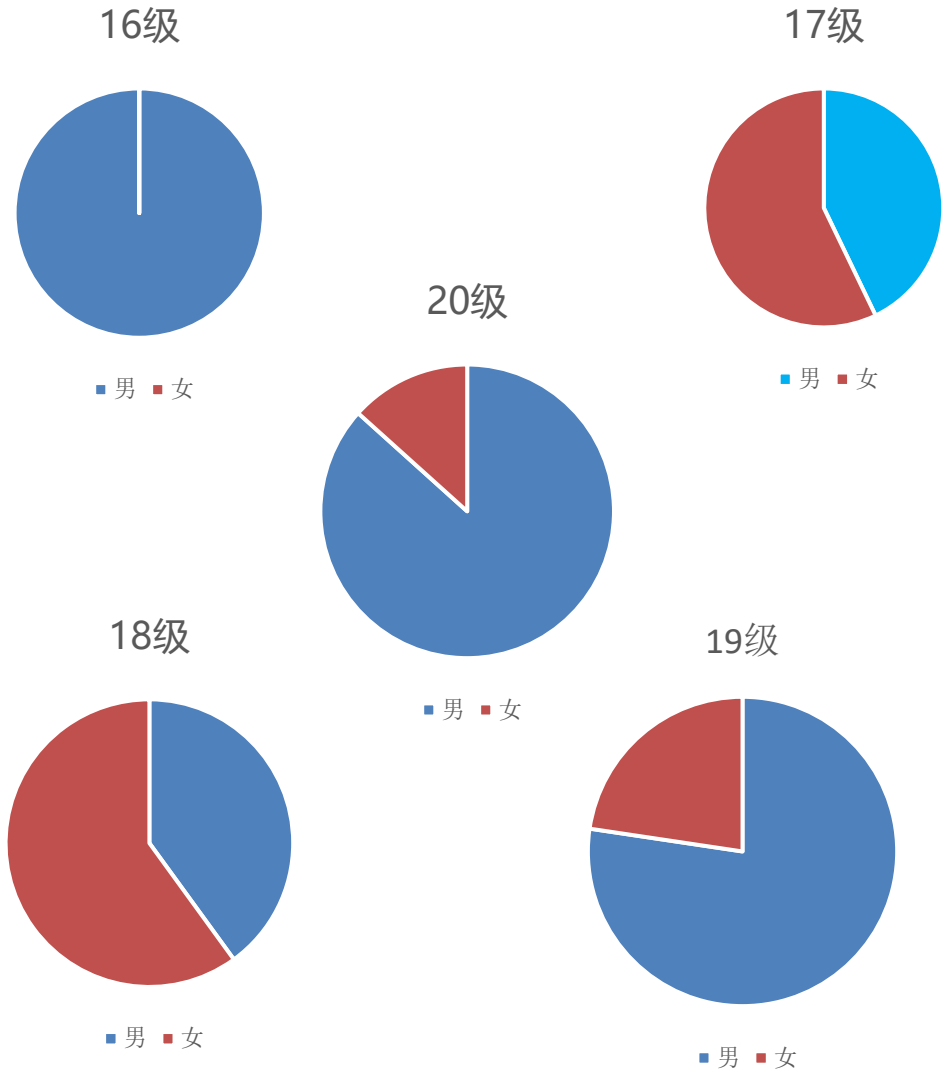
Lecture 01 Homework – Gender Distribution



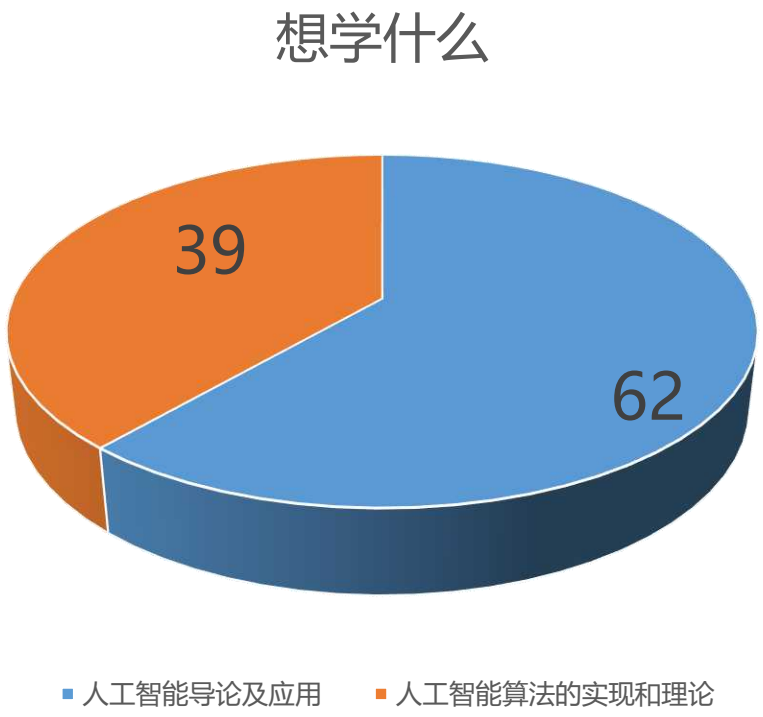


Lecture 01 Homework – Year Distribution





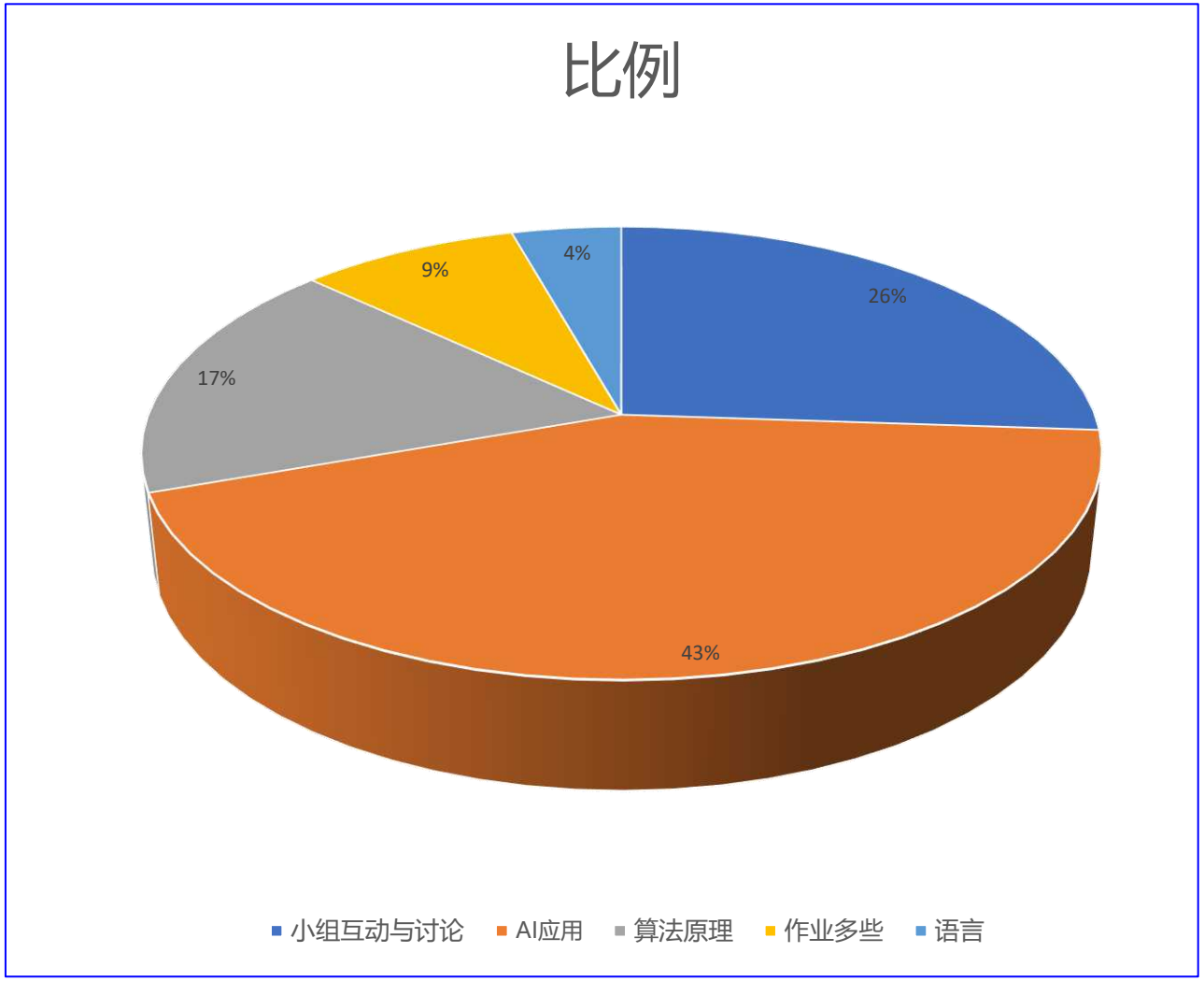
Lecture 01 Homework – Expectation Distribution



1. 希望学到AI的概念
2. 认识AI有一个较为全面的认识
3. 能够在未来有所帮助
4. 虚拟现实和全息投影
5. AI的历史发展和未来
6. 如何获得高分
7. 实践写代码
8. 博弈论
9. python
10. 自然语言处理
11. AI算法的案例
12. AI硬件
13. AI的python实现
14. AI的研究思路
15. AI产品如何诞生
16. AI代码实现
17. 就业前景
18. 需要的数学知识
19. 获得论文阅读能力
20. AI产品的安全性
21. AI伦理
22. 利用AI解决问题
23. 为什么要有AI
24. AI的局限性

- 医学院偏向人工智能应用和导论；
- 计算机系和打算进计算机系偏向算法原理和实现；
- 新生、未入系、其他院系学生总体保持中立。

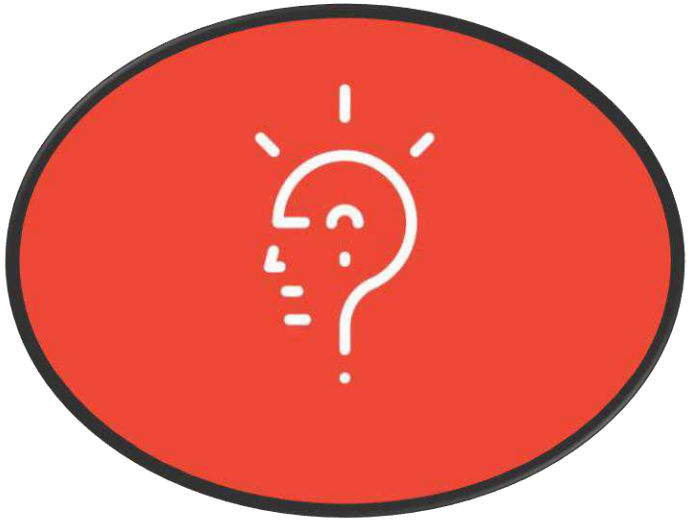
Lecture 01 Homework –Theme Distribution



Lecture 01 Homework – Open Suggestions

1. 启发式开放的
2. 不要有太大负担
3. 想要多提供一些相关的学习资源
4. 说中文
5. 参观AI实验
6. 介绍AI前沿应用
7. 介绍AI算法
8. 介绍算法能够生动（结合图片动画）
9. 希望对AI的介绍尽量全面
10. 介绍生物与AI的结合
11. 提一些有深度的思考题
12. 多讲医学应用，少实践
13. 作业有一定挑战性
14. 知识点和实例结合
15. 有团队合作项目
16. 基础差，介绍详细一点
17. 作业具有启发性
18. 课堂小组讨论
19. 了解AI如何改变生活
20. 有实践内容
21. 介绍AI源代码
22. 分享老师的研究领域
23. 介绍演化算法
24. 希望课前传ppt
25. 上课开始时介绍本次课重点
26. 多留点作业
27. 课上更多互动，如提问、讨论
28. 医学应用之外，讲一些其他的应用
29. 课上多讲英语
30. 希望全汉语的课堂
31. 把医学院的同学跟计系的同学分开对待
32. 想做实际课程项目或比赛
33. 多讲实例少讲概念
34. 按照学生背景布置project
35. 有一定算法基础，多讲智能化医疗趋势
36. 多一些想法和思维碰撞，少一些实践项目

Any Question?



TOPICS

1. CS 103 Module Introduction And Class Rules
2. AI Concepts
3. AI Algorithms
4. AI Applications

Today's Coverage - AI Concepts

2

1. Your AI Concept Survey
2. AI Concepts
3. AI from Computer Science
4. AI and US

Your AI Concept Survey 01: What is AI?

What is “AI (Artificial Intelligence)” in your mind?

Last Year Answers -1

- Apple Jack! 16:55

  游戏中电脑一方

  Casablanca 16:55

  图像识别

  The Million Paramecium 16:55

  决策、分类

  shane 16:56

  自动驾驶?

  忆海 16:56

  处理数据

  二谋的春天 16:56

  向量机?

- 柠檬君 16:56

  让机器学会像人类一样思考

  Constantine 16:56

  可以捕捉并推断信息，并以此为基准进行最优活动

  Apple Jack! 16:56

  学习用户使用习惯

  桦 16:56

  回归

  二谋的春天 16:56

  逻辑回归…

  匡浩玮 16:57

  计算机自我学习

  The Million Paramecium 16:57

  演化算法？[奸笑]

Last Year Answers -2

- 彤 ~ ~98 16:57

  人机交流互动?

  小猪 16:57

  仿照人的思维方式和神经网络进行多层感知学习

  樵枫 16:57

  同时拥有机器计算速度快、决策失误少、数据容量大的特点和人类能分辨图像、处理自然语言和能创造发展等特点的造物

  A 16:57

  人用算法创造的智能?

  The Million Paramecium 16:58

  logistic regression, svm, random forest, XGboost,,CNN....

- 风起萍兮 16:58

  输入一些信息，会输出一些结果，且该结果相对于应用的相关性和正确性会随着输入的信息量的增长而增长的算法

  Constantine 17:00

  楼上意思是大数据吗

  桦 17:00

  是会学习吧

  The Million Paramecium 17:01

  好多跟蛇有关[奸笑]Python，anaconda....

  二谋的春天 17:01

  那不如tensorflow

  二谋的春天 17:01

  tensorlayer

  Bamboo兮 17:11

  不断犯错并修正，缩短学习反馈周期，将偶然能产生的正确结果变为必然。

XGBoost（eXtreme Gradient Boosting）全名叫极端梯度提升，XGBoost是集成学习方法
Anaconda是一个用于科学计算的Python发行版
TensorLayer 是为研究人员和工程师设计的基于Google TensorFlow开发的深度学习与强化学习库

This Morning Answers -3

人造机械"生命"

通过机械方式产生的类人智慧

人造的类人的机器

the matrix
azimov
terminater

从 ANI 到 ASI？

人类制造的 拥有类似于人类推理、决策能力的机器

拥有学习和独立解决一些判断性问题能力的人造机器

可以认知外界，自主学习，自动编程，模拟甚至超越人的学习能力的程序

了解智能的本质

人工智能是通过计算机去做过去只有人才能完成的智能工作

赛博格

@11911633 王晓轩　劳动更准确吧，生老病死 AI 都做不了

赛博格Cyborg，即人类与电子机械的融合系统。曾被认为是属于科幻世界，如今，正在成为现实。

中文名	赛博格
外文名	Cyborg
释义	人类与电子机械的融合系统
简意	混合了有机体与无机物的存在
象征	科技新时代

AI Concepts

2

1 Your AI Concept Survey

2 AI Concepts

3 AI from Computer Science

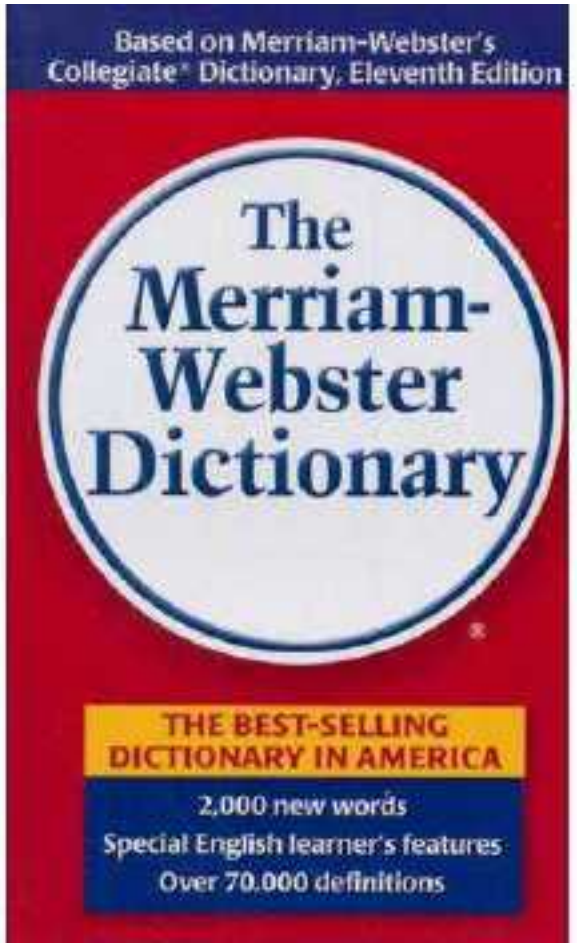
4 AI and US

AI Concepts – “Intelligence” from Dictionaries

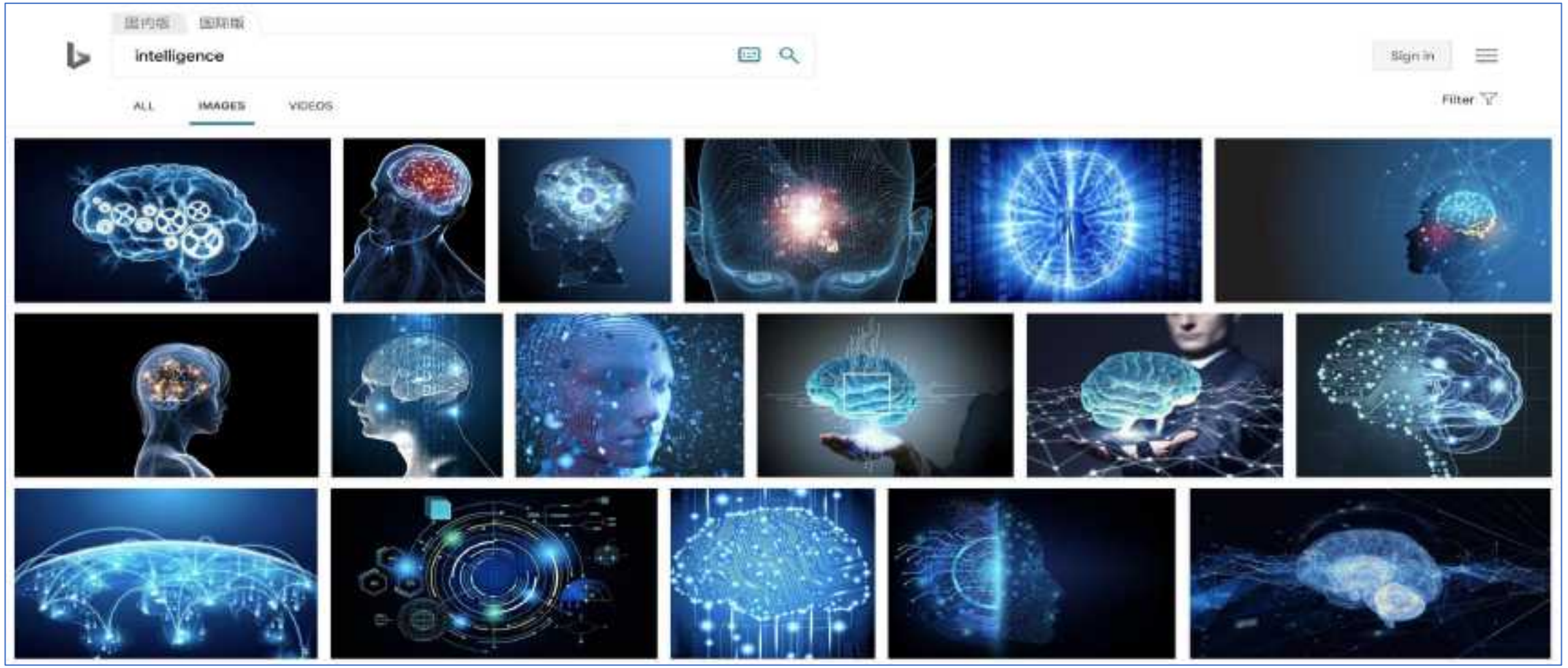
The ability to

- Learn
- Understand
- Deal with
- Try

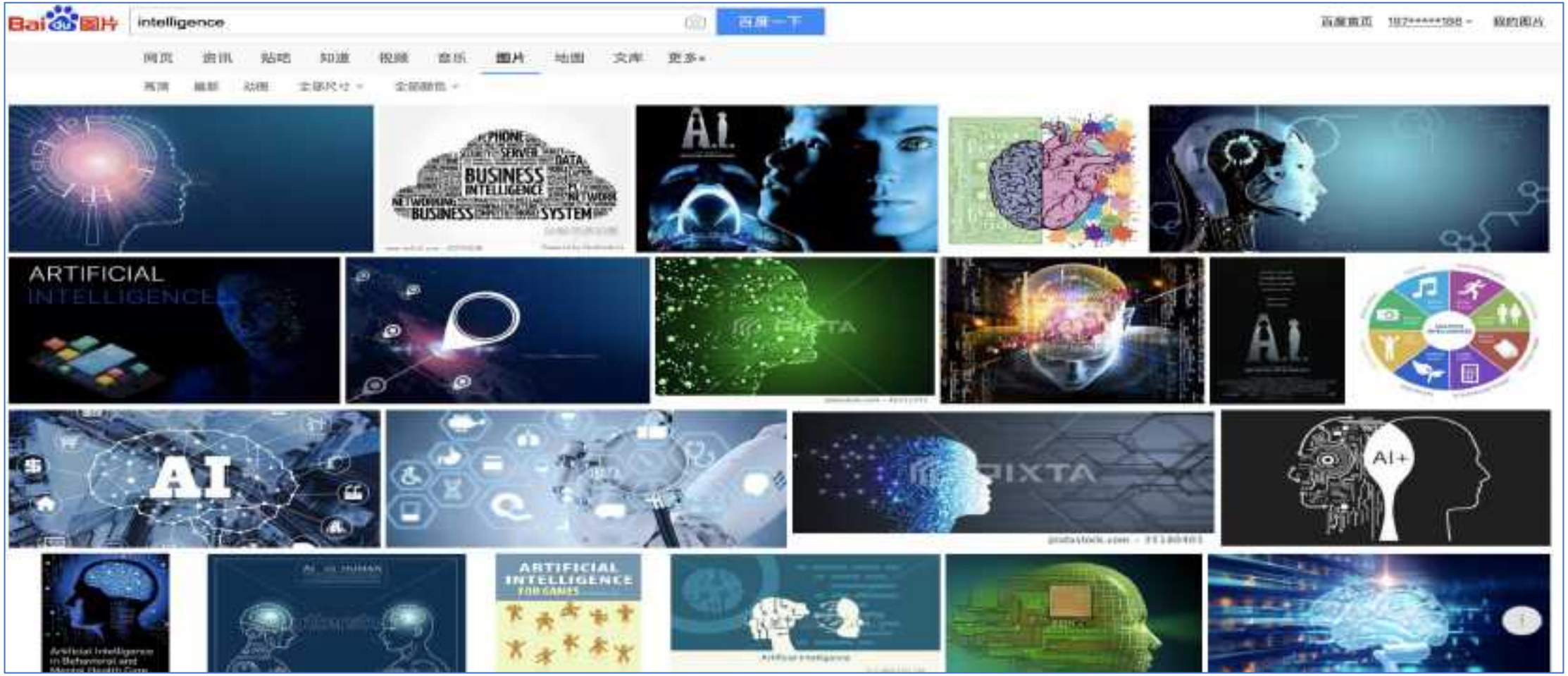
new situations



AI Concepts – “Intelligence” from Bing

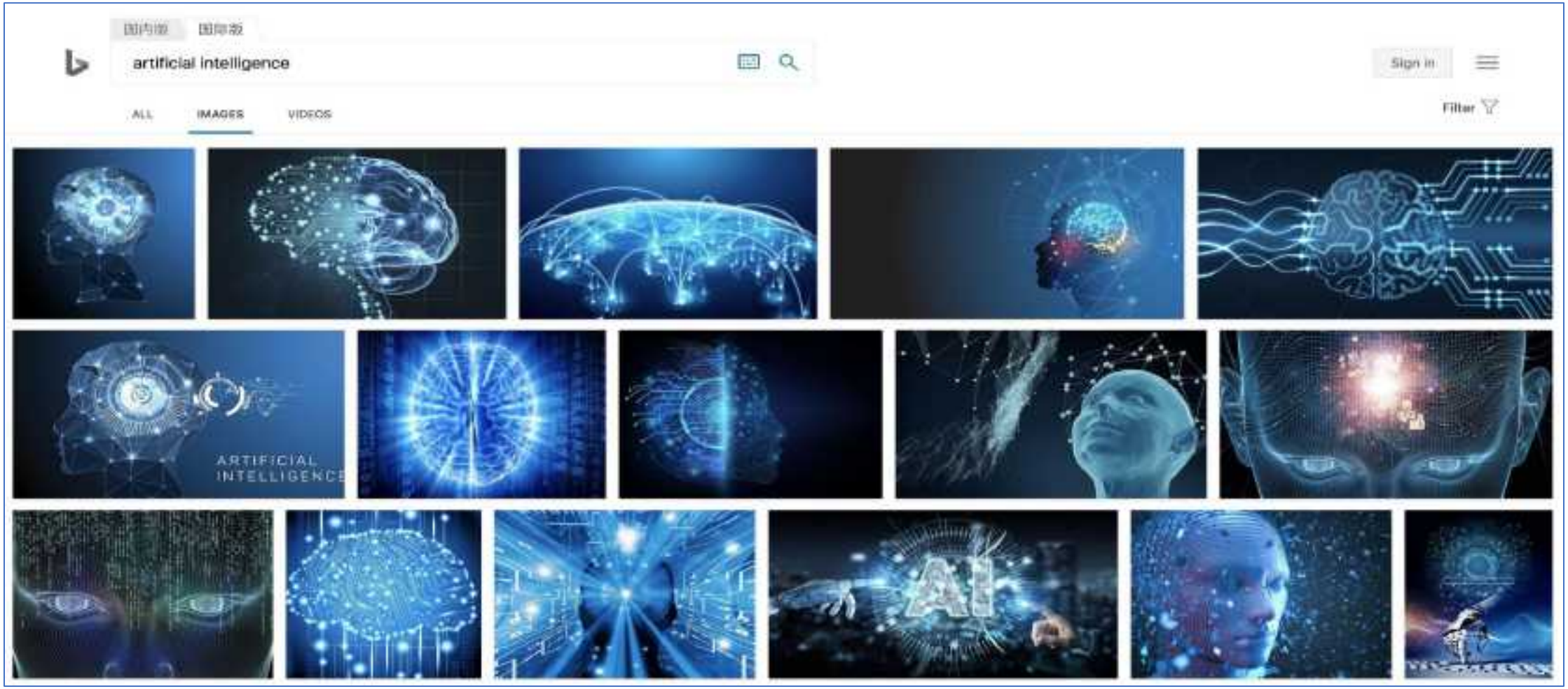


AI Concepts – “Intelligence" from Baidu



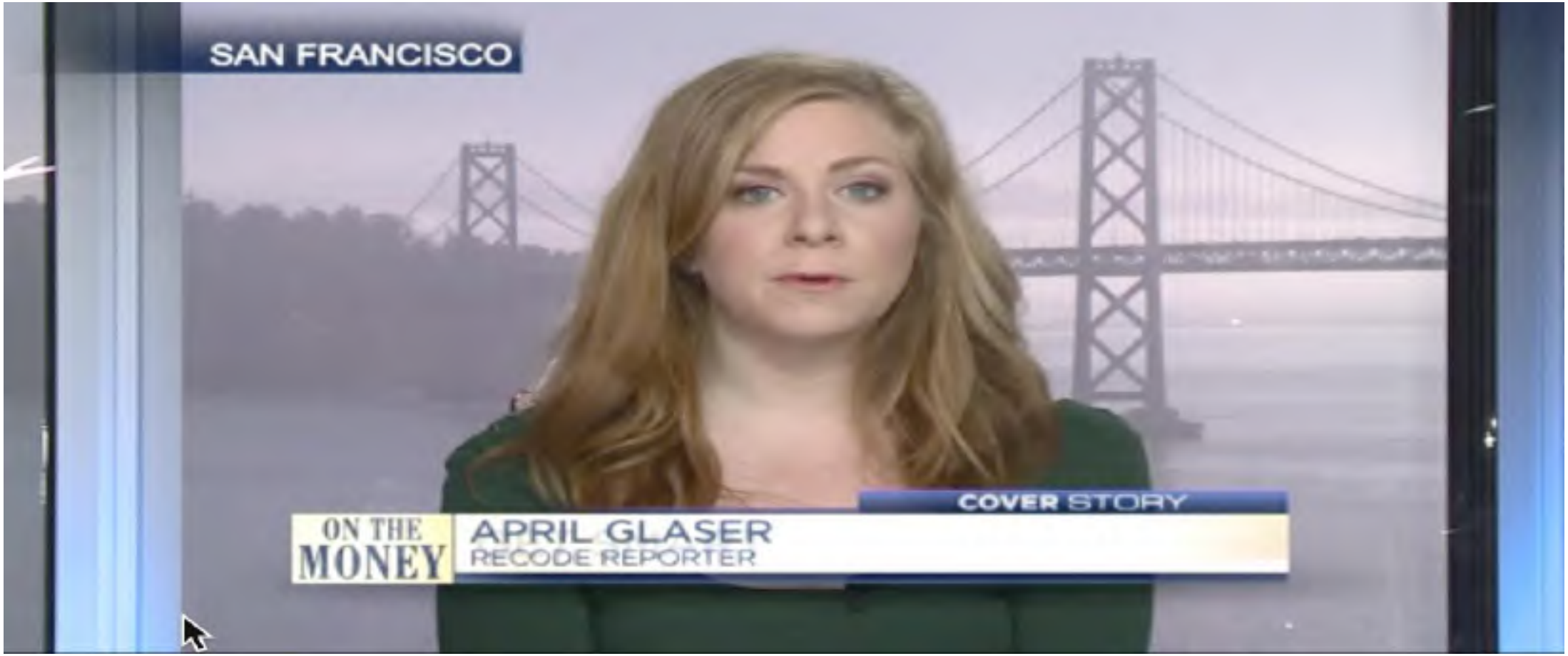
AI Concepts – “智能" from Baidu

AI Concepts – “Artificial Intelligence" from Bing



AI Concepts – “人工智能" from Baidu

AI Concepts – General Public CNBC

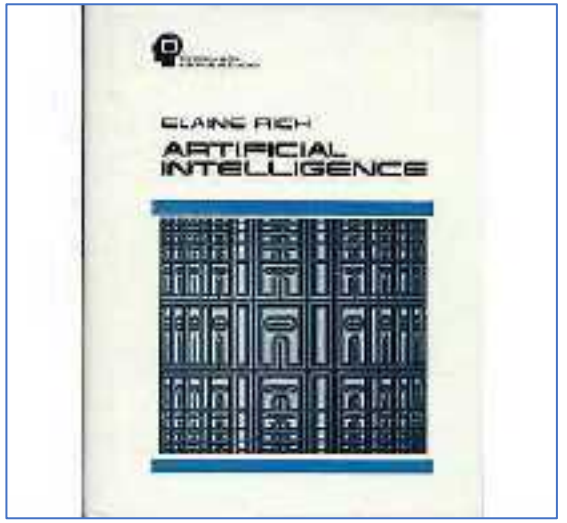


AI Concepts – AI from Dictionaries

- "the capacity of a computer to perform operations analogous to learning and decision making in humans, as by an expert system, a program for CAD or CAM, or a program for the perception and recognition of shapes in computer vision systems. Abbreviation: AI, A.I. "
  – Dictionary.com

- AI is a branch of computer science and engineering that deals with intelligent behaviour, learning, and adaptation in machines.
  -- Wikipedia

- AI is the study of how to make computers do things which, at the moment, people do better.
  --Rich, Elaine (1983). Artificial Intelligence. McGraw-Hill. ISBN 0-07-052261-8.



What is AI? – What Pioneers Said

- Invent a new field of science called "artificial intelligence" (AI)
- "Every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it."

-- Dartmouth Conference 1956

Dartmouth College in Hanover, New Hampshire

J. McCarthy: 达特茅斯学院数学助理教授

M. L. Minsky: 哈佛大学数学与神经学初级研究员

N. Rochester: IBM信息研究经理

C.E. Shannon: 贝尔电话实验室数学家

What is AI? – What The Pioneer Said

- 1948， CALTECH, Bachelor on Math
- 1951， Princeton, Ph.d Math
- 1956， Initiator of Dartmouth Meeting
- 1958， Invent Lisp Language
- 1960， Propose computer time-sharing
- 1971， Turning Award Winner for his contribution to AI
- 1985， IJCAI(the International Joint Conference on Artificial Intelligence) First " Research Excellence Award"
- 1991， US National Medal of Science Award

John McCarthy (1927-2011)

What is AI? – What THE Pioneer Said

” It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable. "

John McCarthy
(1927-2011)

AI Concepts

2

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AI from Computer Science

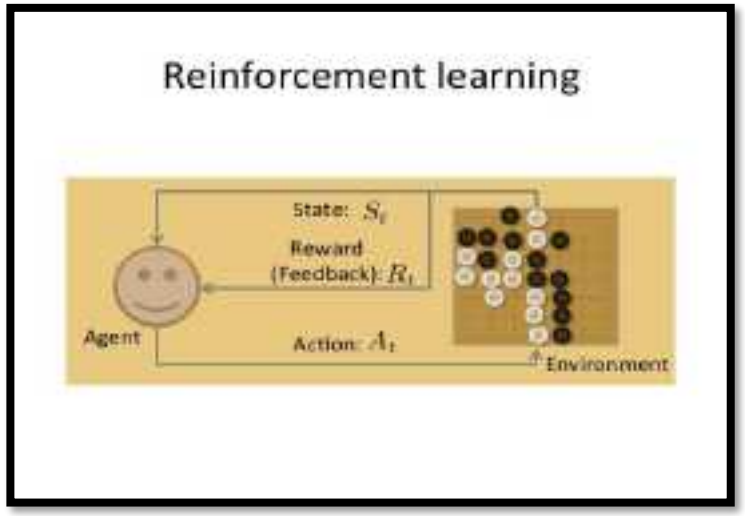
- Artificial intelligence (AI) is the branch of computer science that develops machines and software with intelligence.

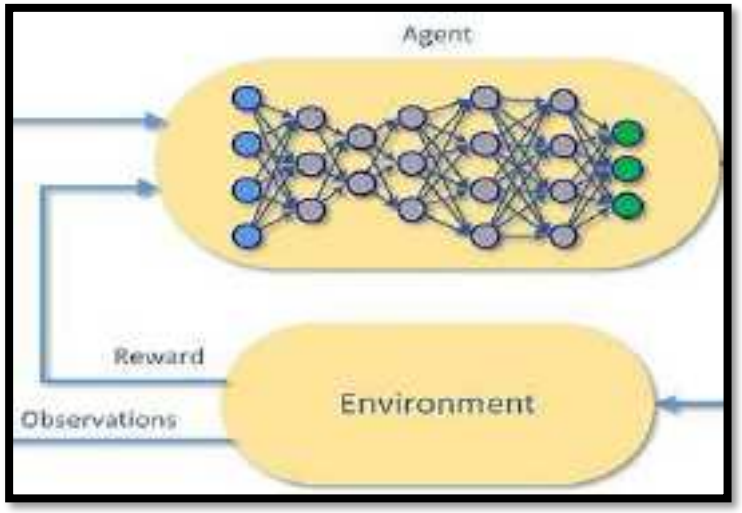
- Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.

```
from numpy import *
from matplotlib.pyplot import *

I = 1
a = 2
T = 4
dt = 0.2
Nt = int(round(T/dt))          # no of time intervals
u = zeros(Nt+1)                # array of u[n] values
t = linspace(0, T, Nt+1)       # time mesh
theta = 1                      # Backward Euler method

u[0] = I                       # assign initial condition
for n in range(0, Nt):         # n=0,1,...,Nt-1
    u[n+1] = (1 - (1-theta)*a*dt)/(1 + theta*dt*a)*u[n]

# Compute norm of the error
u_e = I*exp(-a*t) - u          # exact u at the mesh points
error = u_e - u
E = sqrt(dt*sum(error**2))
print 'Norm of the error: %.3E' % E

# Compare numerical (u) and exact solution (u_e) in a plot
plot(t, u, 'r--o')
t_e = linspace(0, T, 1001)     # very fine mesh for u_e
u_e = I*exp(-a*t_e)
plot(t_e, u_e, 'b-')
legend(['numerical, theta=%g' % theta, 'exact'])
xlabel('t')
ylabel('u')
show()
```

AI Concept- ALPHAGO

AlphaGo



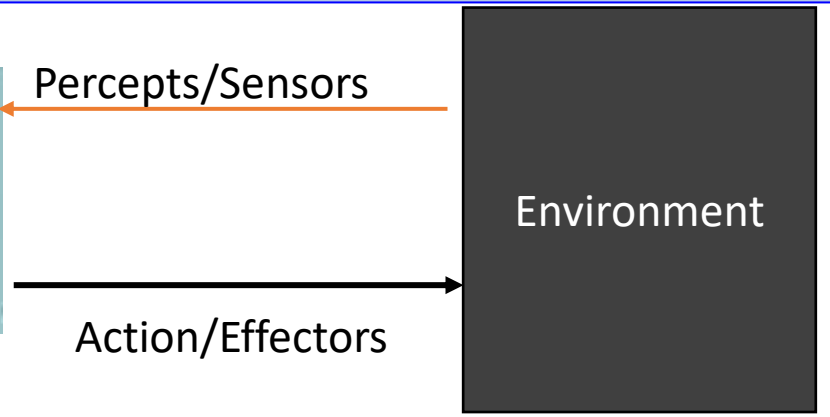


AI from Computer Science - Agent

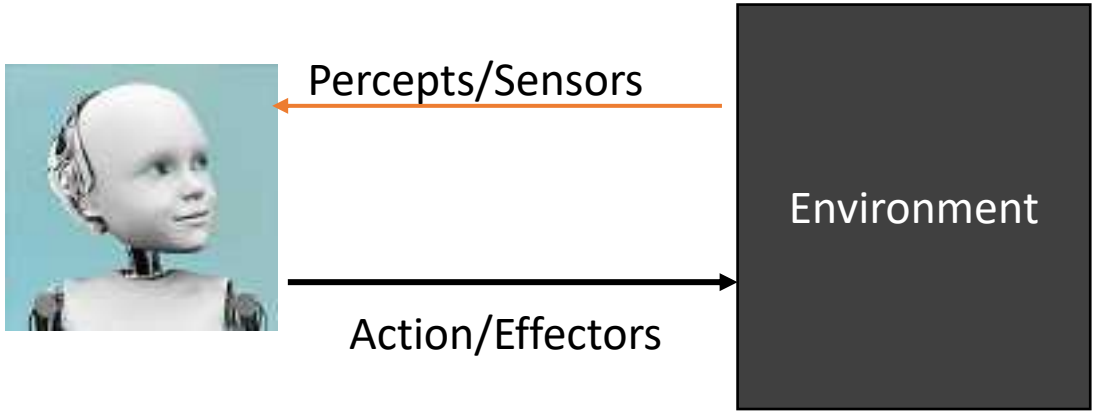
- An agent is anything that can perceive its environment through sensors and acts upon that environment through effectors. Abstractly, an agent is a function from percept histories to actions:

$$[f: P^* \rightarrow A]$$

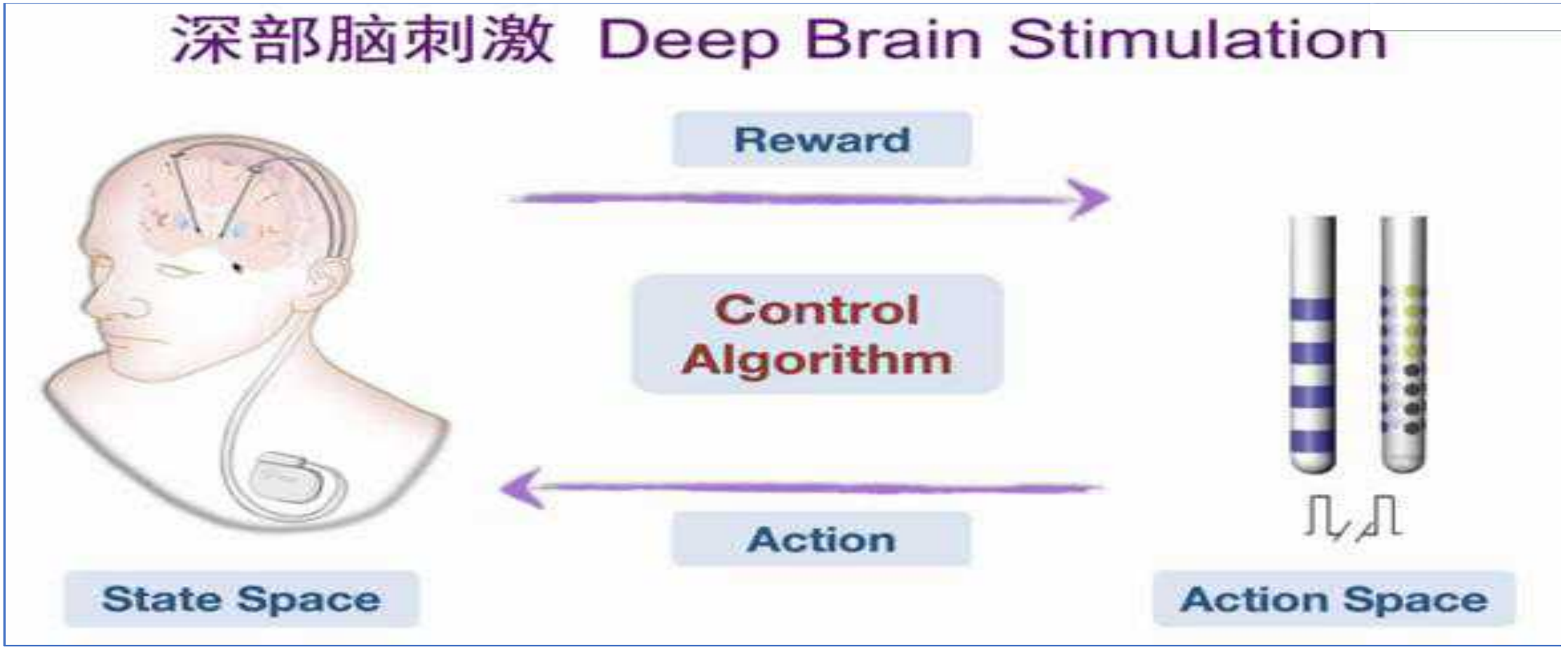
- A human agent has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors, and other organs such as hands, legs, mouth, for effectors.
- A robotic agent replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.
- A software agent has encoded bit strings as its programs and actions.



AI from Computer Science - Self Driving Agent

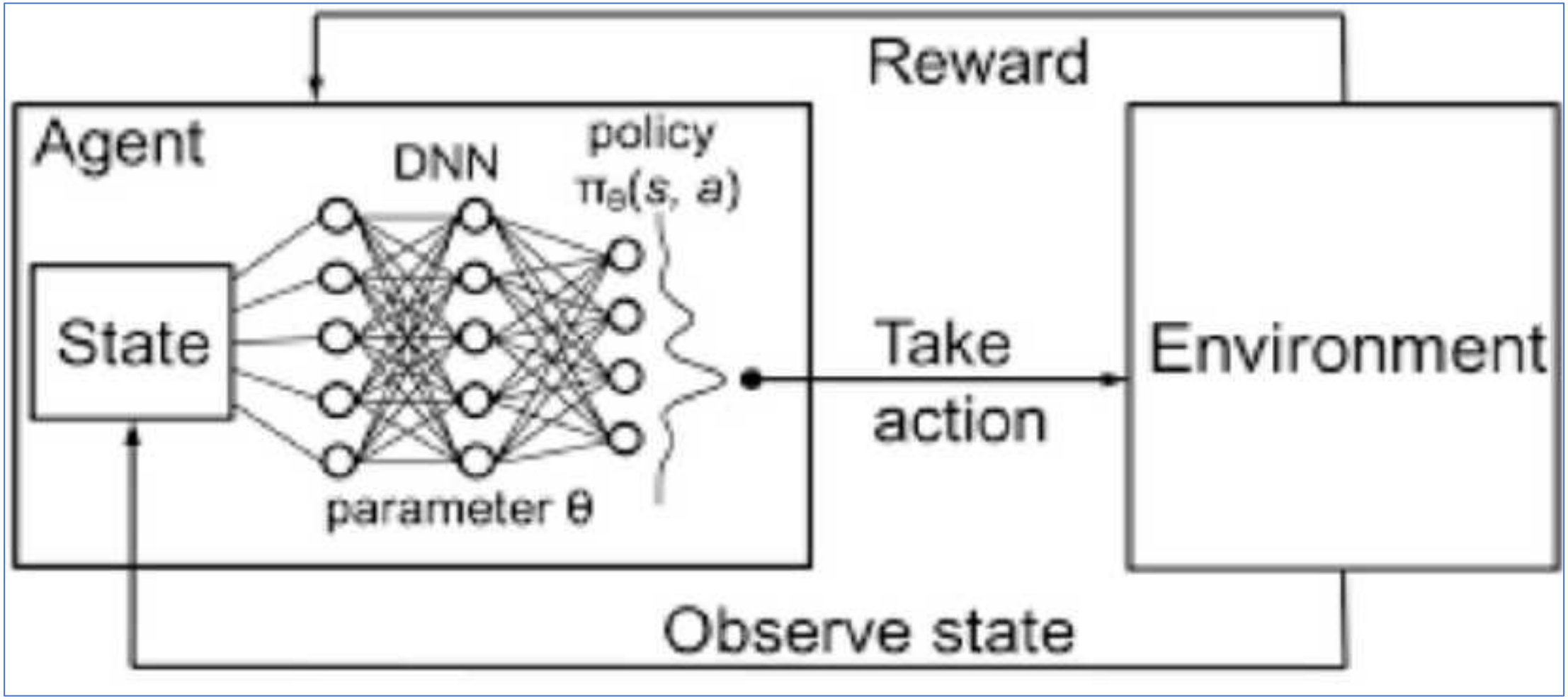


AI from Computer Science - DBS Agent



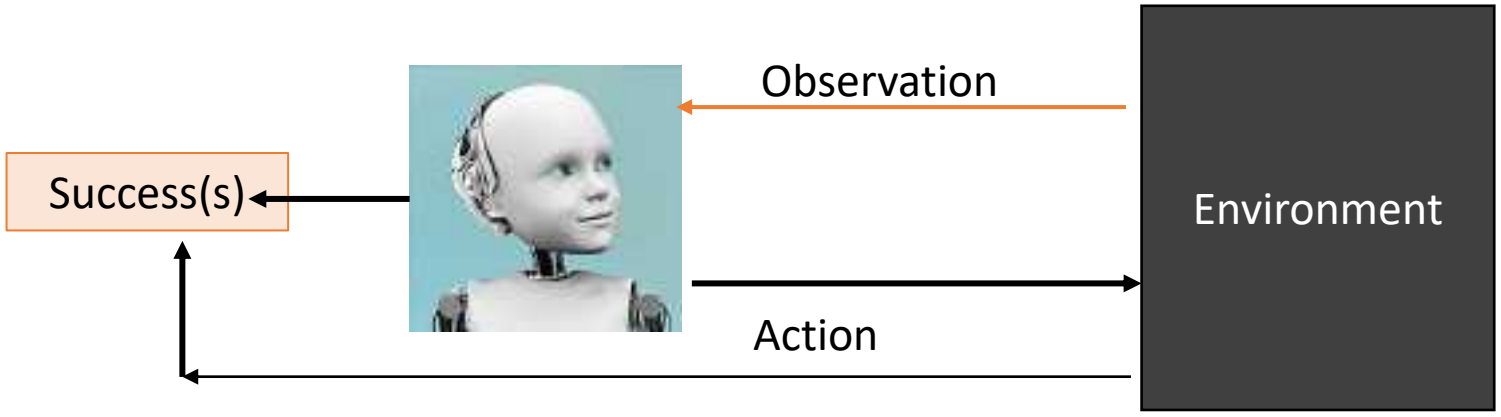
DBS is invented by French Surgeon Alim Louis Benabid and US Neurologist Mahlon Delong

AI from Computer Science -Q Learning Algorithm



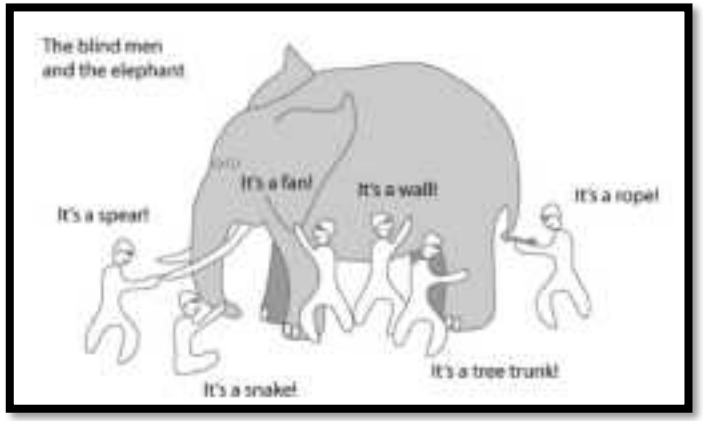
AI from Computer Science - AI Components

- Perceives its environment
  - Observation and understanding of the environment
  - Observations of Facts : pattern recognition, machine learning, deep learning
  - Facts = knowledge (knowledge representation, searching, data mining)
- Take actions
  - Making decisions (searching, reasoning, machine learning, uncertainty management, Evolutionary computation)
- Maximize the change of success
  - Optimization
  - Evolutional computation

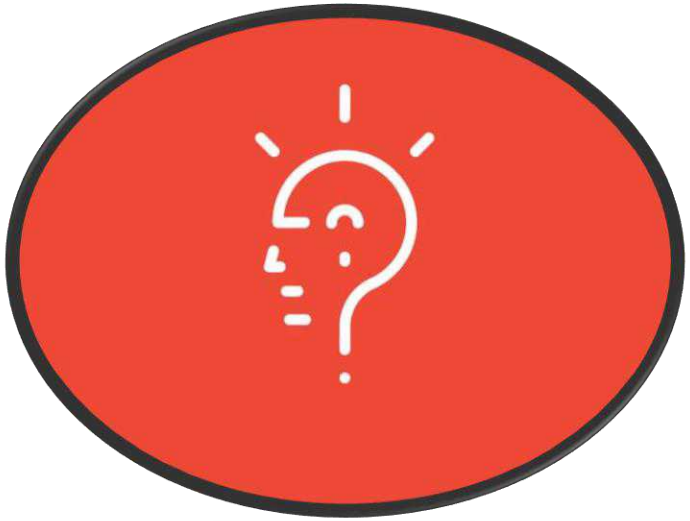


Summary: AI is a developing concept

- You have learnt many definitions of AI
- It is an ever-changing concept and hopefully you will be able to define it in the future



Any Question?



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AI and US - Survey 02

Let us predict: What will be AI research's future direction?

- Mimic?
- Match?
- Overtake?
- Different from "US"?

Voting Results Last Year and this Morning

AI and US- Asilomar AI Principles

- Asilomar AI Principles are 23 guidelines for the research and development of artificial intelligence (AI).
- The Asilomar principles outline AI developmental issues, ethics and guidelines for the development of beneficial AI and to make beneficial AI development easier.
- The tenets were created at the Asilomar Conference on Beneficial AI in 2017 in Pacific Grove, California.
- The conference was organized by the Future of Life Institute.

AI and US - Future of AI?

Narrow AI

Dedicated to assist with or take over specific tasks.

General AI

Takes knowledge from one domain, transfers to other domain.

Super AI

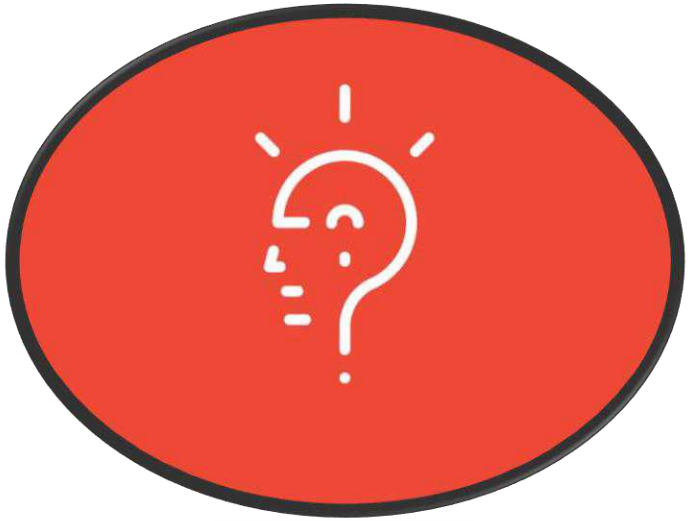
Machines that are an order of magnitude smarter than humans.

Future of AI?

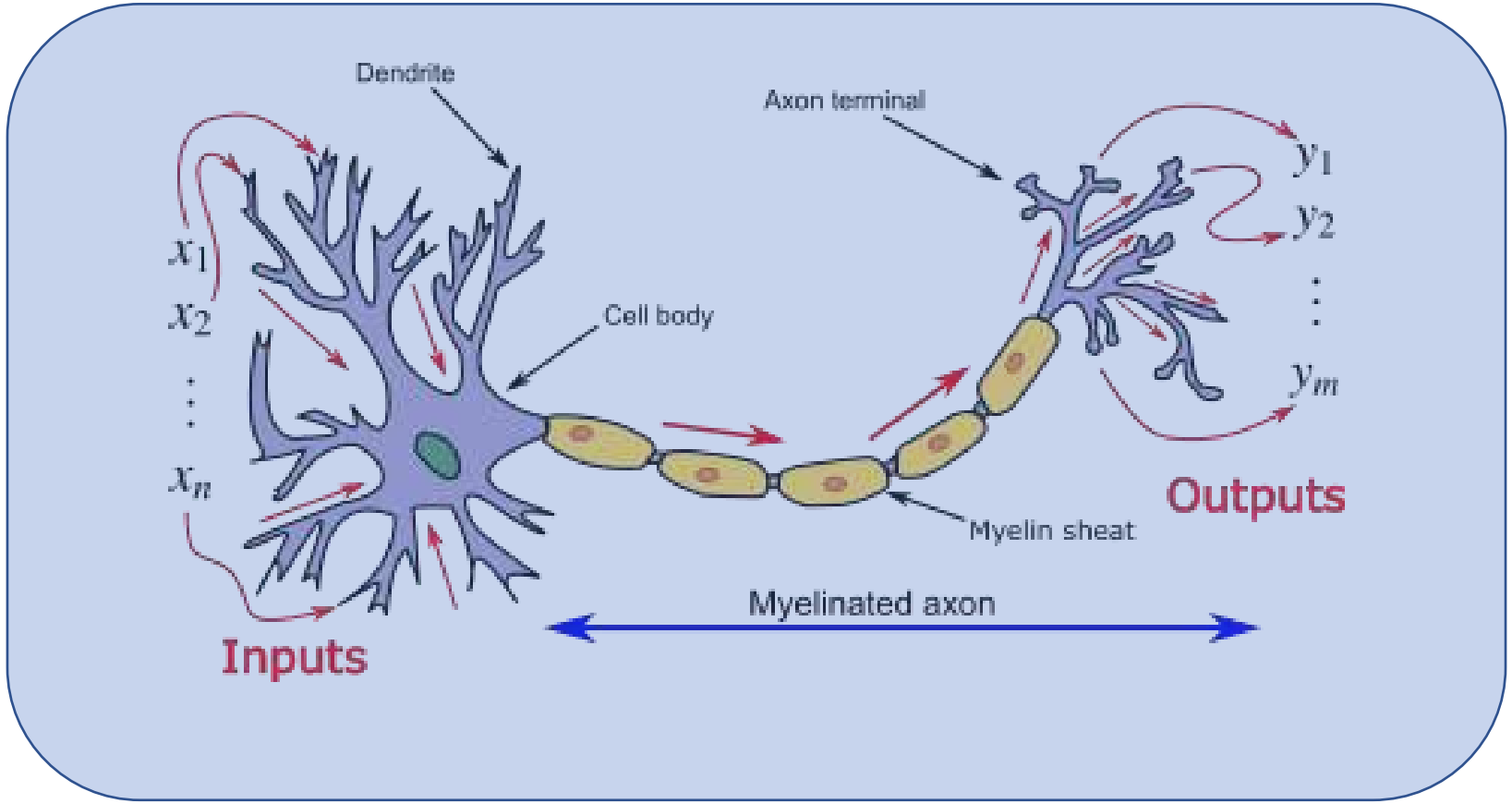
AI and US - Super AI?

- 马斯克想打造超级人类，这源于他与霍金的一个共同忧虑，那就是“总有一天人工智能会崛起，并打败人类。要想战胜人工智能，只有将人类与机器结合，成为比人工智能更为强大的超级人类。”
- 虽然脑机接口技术对人类的益处众多，但能否投入广泛应用还处于未知状态。
- 对于科技的发展总是有人欢喜有人忧，脑机接口是大有可为还是大有可“畏”还无法定论，毕竟它很有可能超出人类认知，而科技向善才是人类发展的必要条件。

Any Question?



Next Lecture :
AI Application and Algorithms Neurological Foundation



Homework 02 (PPT)

1. Read http://jmc.stanford.edu/contributions/index.html
   http://www-formal.stanford.edu/jmc/whatisai/node1.html
   Write down your definition of AI

2. Propose an AI Project You Want to Work on if You Like to Propose a Project and Prepare to Form a Team

CS 103 -02

AI Concept

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