

Artificial Intelligence



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Tiêu đề (Subject): [**xxxx-yy TTNT CLC zz**]

Trong đó:

xxxx: năm học, ví dụ: **2024**

yy: học kỳ, ví dụ: 01, **02**, 03

zz: nhóm môn học, ví dụ: 01, **02**

Ví dụ: [**2024-02 TTNT CLC 02**] ...

Email không ghi tiêu đề trên sẽ được bộ lọc tự động xóa

Đề cương môn học

Lý thuyết: 36

Bài tập: 9

Chuyên cần (10%): Điểm danh ngẫu nhiên hoặc trả lời câu hỏi hoặc làm bài tập nhanh trên lớp

Giữa kỳ (20%): Thi trắc nghiệm

Bài tập lớn (20%): Sinh viên làm việc theo nhóm, chọn chủ đề liên quan tới môn học

Cuối kỳ (50%): Tự luận

Tài liệu tham khảo:

[1] Từ Minh Phương. Bài giảng nhập môn trí tuệ nhân tạo. Học viện công nghệ bưu chính viễn thông. 2010.

[2] Đinh Mạnh Tường. Giáo trình trí tuệ nhân tạo. Đại học quốc gia Hà nội. 2006.

[3] Stuart Russell, Peter Norvig. Artificial Intelligence: A modern Approach, Prentice- Hall, 2002.

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Outlines

CHAPTER 1: INTRODUCTION (CHAPTER 1)

CHAPTER 2: INTELLIGENT AGENTS (CHAPTER 2)

CHAPTER 3: SOLVING PROBLEMS BY SEARCHING (CHAPTER 3)

CHAPTER 4: INFORMED SEARCH (CHAPTER 3)

CHAPTER 5: LOGICAL AGENT (CHAPTER 7)

CHAPTER 6: FIRST-ORDER LOGIC (CHAPTER 8, 9)

CHAPTER 7: QUANTIFYING UNCERTAINTY (CHAPTER 13)

CHAPTER 8: PROBABILISTIC REASONING (CHAPTER 14)

CHAPTER 9: LEARNING FROM EXAMPLES (CHAPTER 18)

Chapter 1:

Introduction

- 1.1 What is AI?
- 1.2 The foundations of AI
- 1.3 The history of AI
- 1.4 The main topics in AI

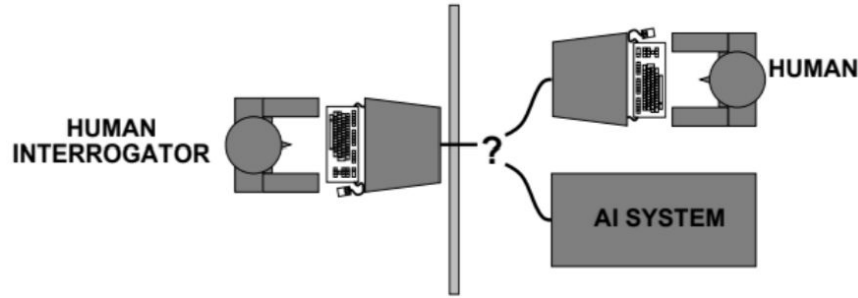
1.1. What Is AI?

- Objective of AI is build intelligent entities.
- Views of AI fall into 4 categories:

Acting Humanly	Thinking Humanly
Thinking Rationally	Acting Rationally

1.1.1 Acting humanly: The Turing Test approach

- Turing (1950) “Computing machinery and intelligence”
- If a computer passes the test then it is a intelligent.



- Suggested major components of AI:
 - **natural language processing:** enable it to communicate successfully in English;
 - **knowledge representation:** store what it knows or hears;
 - **automated reasoning:** use the stored information to answer questions and to draw new conclusions;
 - **machine learning:** adapt to new circumstances and detect and extrapolate patterns.
- Problems: not reproducible, constructive or amenable to mathematical analysis

1.1.2 Thinking humanly: The cognitive modeling approach

- If program's behavior matches corresponding human behavior
=> program's mechanisms could also be operating in humans.
- “General Problem Solver” compares the trace of its reasoning steps to that of human subjects in solving the same problems.
- The approach brings together *computer models from AI* and *techniques from psychology* to construct precise theories of the human mind.
- Cognitive science are now distinct from AI.

1.1.3 Thinking rationally: The “laws of thought” approach

- This approach tended to create intelligent systems by logic programming.
- Various forms of logic were developed: notations and rules of derivation for thoughts.
- Programs could solve any solvable problem described in logical notation.
 - E.g., “Socrates is a man; all men are mortal; therefore, Socrates is mortal.”
- Problems:
 - It is not easy to take informal knowledge and state it in the formal terms required by logical notation (e.g., the knowledge is less than 100% certain.)
 - There is a big difference between solving a problem “in principle” and solving it in practice. (e.g., exhaust the computational resources)

1.1.4 Acting rationally: The rational agent approach

- Rational behavior: doing the right thing
- The right thing: that which is expected to maximize goal achievement, given the available information
- An agent is an entity that perceives and acts
- This course is about designing rational agents
- Advantages:
 - It is more general than the “laws of thought” approach.
 - It is easily extendable with more scientific methodologies.

1.2 The Foundations Of Artificial Intelligence

Field	Description
Philosophy	Logic, methods of reasoning, mind as physical system, foundations of learning, language, rationality.
Mathematics	Formal representation and proof, algorithms, computation, (un)decidability, (in)tractability, probability.
Economics	utility, decision theory, rational economic agents
Neuroscience	neurons as information processing units
Psychology/ Cognitive Science	how people behave, perceive, process information, represent knowledge.
Computer Engineering	building fast computers
Control Theory	design systems that maximize an objective function over time
Linguistic	knowledge representation, grammar

1.3 The History Of Artificial Intelligence

- Early period - 1950's & 60's
 - Game playing
 - brute force
 - Theorem proving
 - symbol manipulation
 - Biological models
 - neural nets
- Symbolic application period - 70's
 - Early expert systems, use of knowledge
- Commercial period - 80's
 - Boom in knowledge/ rule bases
- The 90's and New Millenium
 - Real-world applications, modelling, better evidence, use of theory,...
- 2011 – now:
 - Big data, deep learning

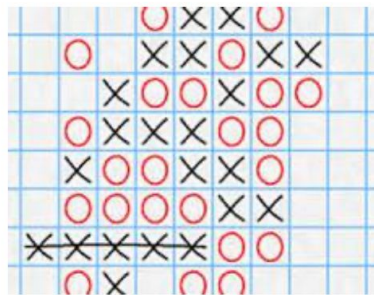
1.4 The main topics in AI

1. Search (includes Game Playing)
2. Representing Knowledge and Reasoning with it
3. Planning
4. Learning
5. Natural language processing
6. Expert Systems
7. Interacting with the Environment
(e.g. Vision, Speech recognition, Robotics)

SOME APPLICATIONS

Board games: Find next move

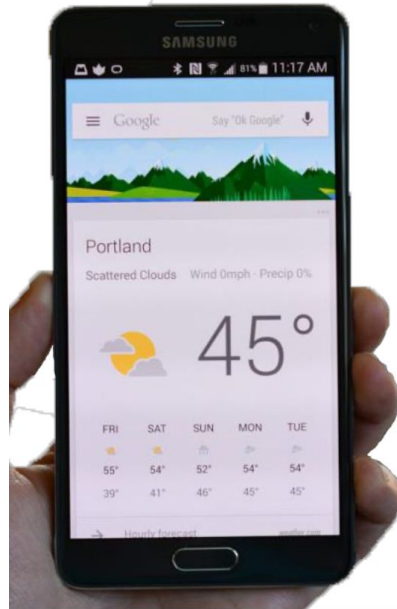
- Tic-tac-toe, Gomoku
- Chess
- Chinese Chess



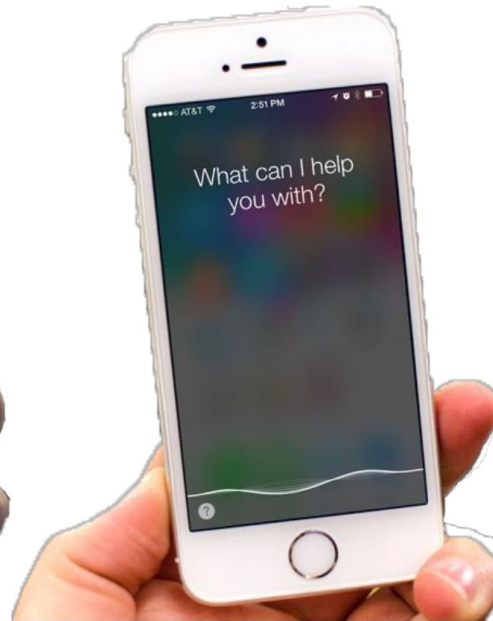
SOME APPLICATIONS

- Virtual Personal Assistants
 - Communicate directly in voice.
 - Support searching information and reminder.

Google Now



Apple Siri



SOME APPLICATIONS

- Self-driving cars
- Detect fraud:
 - Credit cards
- Recommender:
 - Advertisements, movies, news