Artificial Intelligence- Introduction

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Outline

- What is AI?
  - Four possible definitions
- Foundation of AI

Definition

Definition

- There are two dimensions.
  - Though process and Reasoning
  - Behavior
- Values in each dimension are:
  - Humanly
  - Rationally
- Are Humans irrational?

Four Different Definitions

Systems that think like humans	Systems that think rationally
Systems that act like humans	Systems that act rationally

There is another problem: How to check if a system is intelligent or not?

Systems that act like humans

Systems that act like humans

- Turing Test: Proposed by Alan Turin in 1950.
- Intelligent behavior is defined as ability to achieve human-level performance, sufficient to fool an interrogator.
- Necessary Components: NLP, Knowledge Representation, Automated Reasoning and Machine Learning.

Systems that act like humans, Cont

- Total Turing Test: includes Video signals and etc.
- The Turing Test is not reproducible, constructive and not amenable to mathematically analysis.
- Example: Chat Bots

Systems that think like humans

Systems that think like humans

- how humans think, Cognitive Science.
- Is it a good definition?
- Newell and Simon, 1961 developed in "General Problem Solver".
- Other researchers (such as Wang) developed GPS which thinks rationally.

Systems that act like humans, Cont

- Exercise One: Write one paragraph or two about the GPS developed by Newell and Simon, and your idea about it.
- Deadline: Oct, 2nd
- Email Subject: "AI-01"
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Systems that think rationally

Systems that think rationally

- When a decision is rational (correct)?
- Aristotle: Rational thinker always gave correct conclusion given correct premises. (Logic)
- Example: Socrates is a man; All men are mortal, therefore Socrates is mortal.
- Needs a huge amount of computation.
- Example: Autonomous Chess Player

Systems that act rationally

Systems that act rationally

- An **Agent** is something that perceives and acts.
- Every agent has a Goal.
- A rational action is the best action toward Goal.
- Acting Rationally vs Thinking Rationally:
  - Making correct decision is part of being rational.
  - There are situations in which no provable correct action exist.
  - There are also ways of acting rationally other than reasoning.

Systems that act rationally

- This definition is clearly defined and completely general.
- It sometimes takes too long to achieve perfect rationality.
- Limited Rationality: Acting appropriately when there is not enough resource.

Mathematics

- Algorithm
- Logic: Incompleteness Theorem
- Computation: Intractable Problems
- Theory of Probability

Computer Engineering

- Computer: an artifact that can be Intelligent
- Computer: as a tool for computation
- Programming Languages