Session 1: Introduction to Artificial Intelligence

Course Title: Computational Intelligence

Course Code: CSC401A

Vaishali R Kulkarni

Department of Computer Science and Engineering
Faculty of Engineering and Technology
M. S. Ramaiah University of Applied Sciences
Email: *vaishali.cs*.et@msruas.ac.in

Introduction to AI

- Intelligence is important to human being. For thousands of years, we have tried to understand how we think, perceive, understand, predict, and manipulate a world.
- AI is intelligence demonstrated by machines, unlike the natural intelligence displayed by humans and animals. Leading AI textbooks define the field as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. AI is one of the newest fields in science and engineering.
- **AI** as the “copy of something natural(i.e., human beings) ‘WHO’ is capable of acquiring and applying the information it has gained through exposure.”
- AI currently encompasses a huge variety of subfields, ranging from the general (learning and perception) to the specific, such as playing chess, proving mathematical theorems, writing poetry, driving a car on a crowded street, and diagnosing diseases. AI is relevant to any intellectual task; it is truly a universal field.

8 Definitions of AI

Thinking Humanly	**Thinking Rationally**
"The exciting new effort to make computers think . . . *machines with minds*, 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)	"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	**Acting Rationally**
"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)	"Computational Intelligence is the study of the design of intelligent agents." (Poole *et al.*, 1998) "AI . . . is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

Acting and Thinking humanly

- The Turing Test, proposed by Alan Turing TURING TEST (1950), was designed to provide a satisfactory operational definition of intelligence. A computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses come from a person or from a computer.

- To pass the total Turing Test, the computer will need computer vision to perceive objects, and robotics to manipulate objects.

- The computer would need to possess the **natural language processing**, **knowledge representation**, **automated reasoning** and **machine learning**

Thinking humanly: The cognitive modeling approach

- If we are going to say that a given program thinks like a human, we must have some way of determining how humans think. We need to get inside the actual workings of human minds.

- There are three ways to do this: through introspection, psychological experiments and brain.

- The interdisciplinary field of cognitive science brings together computer models from AI and experimental techniques from psychology to construct precise and testable theories of the human mind.

Thinking and Acting rationally

- Thinking rationally: Law of sought approach. Eg: “Socrates is a man; all men are mortal; therefore, Socrates is mortal.”

- There are two main obstacles: First, it is not easy to take informal knowledge and state it in the formal terms required by logical notation and there is a big difference between solving a problem “in principle” and solving it in practice.

- **Acting rationally: The rational agent approach. Here** An **agent** is just something that acts operate autonomously, perceive their environment, persist over a prolonged time period, adapt to. A **rational agent** acts so as to achieve the best outcome.

Foundation of AI

- **Philosophy:** Can formal rules be used to draw valid conclusions? How does the mind arise from a physical brain? Where does knowledge come from? How does knowledge lead to action?
- **Economics:** How should we make decisions so as to maximize payoff? How should we do this when others may not go along? How should we do this when the payoff may be far in the future?
- **Mathematics:** What are the formal rules to draw valid conclusions? What can be computed? How do we reason with uncertain information?
- **Neuroscience:** How do brains process information?
- **Phycology**: How do humans and animals think and act?

History of AI

- **1956: Cybernetics and early neural networks, Turing's test, Game AI, Symbolic reasoning and the Logic Theorist, Dartmouth Conference 1956: the birth of AI**
- **1952–1969: Golden Era of AI, Reasoning as search, Natural language, Micro-worlds, Robotics**
- **1966–1973: Expert systems, fifth generation computer**
- **1969–1979:**
- **AI becomes an industry (1980–present)**

What can AI do today

- Robotic vehicles
- Speech recognition
- Autonomous planning and scheduling
- Game playing
- Spam fighting
- Logistics planning
- Robotics:
- Machine Translation

References

- Artificial Intelligence A Modern Approach Third Edition by Stuart J. Russell and Peter Norvig