

# Introduction to Artificial Intelligence

## (Lecture 1)



# Intelligence

- What it is?
- We know it when we observe it!
- Normally associated with the behavior of living organisms
- Intelligence is the most distinctive characteristic of mankind.
- Intelligence can be defined in different ways like:
  - ✓ *To be rational*
  - ✓ *To be able to understand*
  - ✓ *To be witty*
  - ✓ ....
- Intelligence could also be defined as the capacity to acquire and apply knowledge.

# Intelligence

- Intelligence encompasses abilities such as:
  - ✓ *Understanding language*
  - ✓ *Perception*
  - ✓ *Reasoning*
  - ✓ *Learning*
- One may craft many definitions according to one's understanding!
- One important observation about the aforementioned definitions: We recognize intelligence by its attributes.

# Intelligence

- The enigma of what intelligence is has challenged the minds of philosophers for ages.
- There is no hope of its precise definition in the foreseeable future!
- No definition mentioned thus far helps us to artificially create it!

# Intelligence

There are so many questions one can ask about intelligence and its nature.

- **What do we mean by intelligence?**
- **Is intelligence a single faculty, or is it just name of collection of distinct and unrelated abilities?**
- **To what extent is intelligence learned as opposed to having a prior existence?**
- **Exactly, what does happen when learning occurs?**
- **What is creativity?**
- **What is intuition?**
- **What is self-awareness and what role does it play in intelligence?**
- **Can intelligence be inferred from observable behaviors?**
- **Or does it require evidence of a particular mechanism?**
- **How is knowledge represented in the nerve tissue of a living being?**
- **And what lessons does this have for the design of intelligent machines?**
- **Is it possible to achieve intelligence on a computer?**
- **Or does an intelligent entity require the richness of sensation and experience that might be found only in a biological existence?**
- **Is intelligent behavior the same for a computer and a human?**

# Artificial Intelligence

- AI is the study of how to make computers do things, which at the moment people can do better.
- A branch of computer science that is concerned with the automation of intelligent behavior of human beings.
- A branch of computer science that is concerned with the development of a thinking machine. (Teach machines how to think and they can think!)
- A field of study in computer science that chases the goal of making a computer reason in a manner similar to humans.
- It involves the design and study of computer programs that behave intelligently.

# Artificial Intelligence

- AI is the study of ideas that enable computers to be intelligent.
- AI is the part of computer science concerned with design of computer systems that exhibit human intelligence.
- AI is the branch of computer science that is concerned with the automation of intelligent behavior.
- AI is the science of making machines do things that would require intelligence if done by people.
- It is the collection of problems and methodologies studied by AI researchers.

# Artificial Intelligence

AI is the part of computer science concerned with designing intelligent computer systems, that is, computer systems that exhibit the characteristics we associate with intelligence in human behaviour understanding language, learning, reasoning, and solving problems.

Artificial Intelligence is the scientific understanding of the mechanisms underlying thought and behavior and their embodiment in machines (AAAI).





# Schools of Thought

## Weak AI Versus Strong AI

- As discussed earlier, AI is considered to be an effort to try to simulate 'intelligent human behavior'. But the need is to define up to what extent the computer can demonstrate the simulation, raising the idea of strong AI and weak AI

# Weak AI Versus Strong AI

- **Strong AI:** the computer is not merely a tool in the study of the mind; rather, the appropriately programmed computer really is a mind in the sense that computers given the right program can have the ability to understand and have other cognitive states.
- **Weak AI:** advocates that the principle value of computer in the study the mind is that it gives us a very powerful tool which enables us to formulate and test hypothesis in a more rigorous and precise fashion.

# Intelligent Machine Success Criteria

## Alan Turing's *Imitation Game*

- In his article *Computing Machinery and Intelligence* published in the journal *Mind*, Alan Turing asked the intriguing question: Can machines think?
- To answer the question, he proposes to use the Imitation Game with human replaced by computer.



# Intelligent Machine Success Criteria



## The Loebner Prize

- In 1990 Hugh Loebner agreed with The Cambridge Center for Behavioral Studies to underwrite a contest designed to implement the Turing Test.
- Dr. Loebner pledged a Grand Prize of \$100,000 and a Gold Medal for the first computer whose responses were indistinguishable from a human's. Such a computer can be said "to think."
- Each year an annual cash prize and a bronze medal is awarded to the most human-like computer.

# What researchers say...?

- *The material for the section :What researchers say...? has been taken from the website of AAI*
- John McCarthy, one of the founders of the field and the person who coined the very word: Artificial Intelligence, has the following view point
- "Q. *What is artificial intelligence?*
- A. 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.
- Q. *Yes, but what is intelligence?*
- A. Intelligence is the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines."

# What researchers say...?

- David Cohn in an interview on July 17, 2006, said: "Artificial intelligence is 50 years old this summer, and while computers can beat the world's best chess players, we still can't get them to think like a 4-year-old..."

# What researchers say...?

- Ray Kurzweil says: “Artificial intelligence has accomplished more than people realize. It permeates our economic infrastructure. Every time you place a cell phone call, send an e-mail, AI programs are directing information.”

# What researchers say...?

- Marvin Minsky, in an interview, says: “*What Is Artificial Intelligence?* Even though we don't yet understand how brains perform many mental skills, we can still work toward making machines that do the same or similar things. 'Artificial intelligence' is simply the name we give to that research. But as I already pointed out, this means that the focus of that research will keep changing, since as soon as we think we understand one mystery, we have to move on to the next.”



## WHAT COMPUTERS CAN DO TODAY?

- Mathematics
- Logical deductions
- Search a solution from given solutions
- Sequence jobs
- Drive cars

## WHAT COMPUTERS CAN NOT DO TODAY?

- Think?
- Create? OR Have Creativity?
- Have Intuition?
- Self awareness?
- See?
- .....



# Next Lecture

- History of AI
- Application Areas
- AI as Representation & Search