

## Artificial Intelligence WEEK - 1

### Outlines

- Scope
- Intelligence vs. Artificial intelligence
- Natural intelligence vs. artificial intelligence
- AI computing vs. traditional computing

---

## ARTIFICIAL INTELLIGENCE

---

### What is Intelligence?

#### INTELLIGENCE

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 is Intelligence?

The ability of a system to calculate, reason, perceive relationships and analogies, learn from experience, store and retrieve information from memory, solve problems, comprehend complex ideas, use natural language fluently, classify, generalize, and adapt new situations.

#### TYPES OF INTELLIGENCE

As described by Howard Gardner, an American developmental psychologist, the Intelligence comes in multifold

Intelligence	Description	Example
Linguistic intelligence	The ability to speak, recognize, and use mechanisms of phonology (speech sounds), syntax (grammar), and semantics (meaning).	Narrators, Orators
Musical intelligence	The ability to create, communicate with, and understand meanings made of sound, understanding of pitch, rhythm.	Musicians, Singers, Composers
Logical-mathematical intelligence	The ability of use and understand relationships in the absence of action or objects. Understanding complex and abstract ideas.	Mathematicians, Scientists
Spatial intelligence	The ability to perceive visual or spatial information, change it, and re-create visual images without reference to the objects, construct 3D images, and to move and rotate them.	Map readers, Astronauts, Physicists
Bodily-Kinesthetic intelligence	The ability to use complete or part of the body to solve problems or fashion products, control over fine and coarse motor skills, and manipulate the objects.	Players, Dancers
Interpersonal intelligence	The ability to recognize and make distinctions among other people's feelings, beliefs, and intentions.	Mass Communicators, Interviewers

A machine or a system is **artificially intelligent** when it is equipped with at least one and at most all intelligences in it.

#### COMPONENTS OF INTELLIGENCE

The intelligence is intangible. It is composed of -

- Reasoning
- Learning

- Problem Solving
- Perception
- Linguistic Intelligence and more...



- **REASONING:**

It is the set of processes that enables us to provide basis for judgement, making decisions, and prediction. There are broadly two types -

Inductive Reasoning	Deductive Reasoning
It conducts specific observations to makes broad general statements.	It starts with a general statement and examines the possibilities to reach a specific, logical conclusion.
Even if all of the premises are true in a statement, inductive reasoning allows for the conclusion to be false.	If something is true of a class of things in general, it is also true for all members of that class.
Example - "Nita is a teacher. Nita is studious. Therefore, All teachers are studious."	Example - "All women of age above 60 years are grandmothers. Shalini is 65 years. Therefore, Shalini is a grandmother."

- **LEARNING:**

The achievement from the outside environment, In any situation, that increases your knowledge is called learning.

OR

Any direct change in one's knowledge to perform some action successfully.

- **PROBLEM SOLVING:**

Intelligent person must be quick problem solver.

- **THINKING:**

Thinking is divided into two parts:

- **CONVERGENT THINKING OR LOGICAL THINKING:** the thinking required to solve a logical problem is called logical thinking. For example: 10 is greater than 5.
- **DIVERGENT THINKING OR CREATIVE THINKING:** creativity is almost God gifted. It is the origination of the new ideas and concepts. For example: artistic works, painting, poetry, story writing etc.

- **UNDERSTANDING:**

An intelligent person must have the ability to draw the meaningful conclusions from the ambiguous facts. We can define it as "intelligent entity must have the ability to understand the ambiguous and contradictory statements.

- **FLEXABLE RESPONSE:**

Intelligent persons respond flexibly when faced with identical situations.

- **COGNITION:**

Another characteristic of an intelligent person is that of **cognition**. It can be defined as "immediate awareness of new information" or to keep himself update with new information to survive in the complex and changing environment.

- **INFORMATION HANDLING:**

Intelligent person should have the ability to store and retrieve information to and from memory rapidly.

## What is Artificial Intelligence?

Definition...

**Artificial Intelligence** is a branch of Science which deals with helping machines find solutions to complex problems in a more human-like fashion.

AI has 2 characteristics

This generally involves

- borrowing characteristics from human intelligence,
- applying them as algorithms in a computer friendly way.

"Artificial intelligence is the study of how to make computers do things at which, at the moment, people are better".

AI is "getting machines to do smart things"

"The study of the computations that make it possible to perceive, reason, and act"

AI is generally categorized as following:

	Human Like	Rationally
Think:	Cognitive Science Approach "Machines that think like humans"	Laws of thought Approach "Machines that think Rationally"
Act:	Turing Test Approach "Machines that behave like humans"	Rational Agent Approach "Machines that behave Rationally"

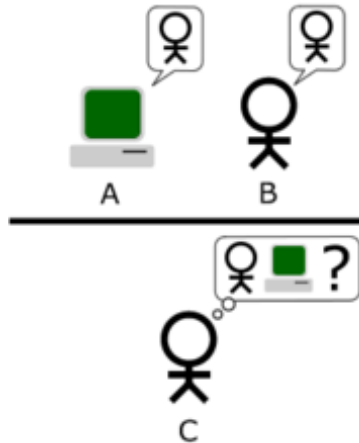
"AI is the part of computer science concerned with designing intelligent computer systems, that is, systems that exhibit the characteristics we associate with intelligence in human behavior".

**AI** is generally associated with Computer Science, but it has many important links with other fields such as Maths, Psychology, Cognitive science, neuroscience, Biology and Philosophy, among many others. Our ability to combine knowledge from all these fields will ultimately benefit our progress in the quest of creating an intelligent artificial being.

---

### Turing Test (Act Human-Like)

- (Human) judge communicates with a human and a machine over text-only channel,
- Both human and machine try to act like a human,
- Judge tries to tell which is which.



### Philosophy of AI

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, "Can a machine think and behave like humans do?"

Thus, the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

### Goals of AI

- To Create Expert Systems - The systems which exhibit intelligent behavior, learn, demonstrate, explain, and advice its users.
  - To Implement Human Intelligence in Machines - Creating systems that understand, think, learn, and behave like humans.
- 
- 

### NATURAL INTELLIGENCE VS ARTIFICIAL INTELLIGENCE

- Artificial intelligence is permanent while natural intelligence is perishable.
  - Artificial intelligence is less expensive while natural intelligence is very expensive.
  - Artificial intelligence can be duplicated easily while transferring a knowledge from one human to another is very complicated & slow process.
  - Natural intelligence is creative while artificial intelligence is feeded.
  - Artificial intelligence is the child of natural intelligence.
- 

### WHEN DID AI RESEARCH START?

#### History of AI

After WWII, a number of people independently started to work on intelligent machines. The English

mathematician Alan Turing may have been the first. He gave a lecture on it in 1947. He also may have

cs/learners.com

been the first to decide that AI was best researched by programming computers rather than by building machines. By the late 1950s, there were many researchers on AI, and most of them were basing their work on programming computers.

In 1956, the term Artificial Intelligence was defined by John McCarthy. He defined AI as: '**The science and engineering of making intelligent machines.**'

---

## Why Artificial Intelligence?

### Motivation...

Computers are fundamentally well suited to performing mechanical computations, using fixed programmed rules. This allows artificial machines to perform simple monotonous tasks efficiently and reliably, which humans are ill-suited to. For more complex problems, things get more difficult... Unlike humans, computers have trouble understanding specific situations, and adapting to new situations. **Artificial Intelligence aims to improve machine behavior in tackling such complex tasks.**

Together with this, much of AI research is allowing us to understand our intelligent behavior. Humans have an interesting approach to problem-solving, based on abstract thought, high-level deliberative reasoning and pattern recognition. Artificial Intelligence can help us understand this process by recreating it, then potentially enabling us to enhance it beyond our current capabilities.

---

## When will Computers become truly Intelligent?

### Limitations...

To date, all the traits of human intelligence have not been captured and applied together to spawn an intelligent artificial creature. Currently, Artificial Intelligence rather seems to focus on lucrative domain specific applications, which do not necessarily require the full extent of AI capabilities. This limit of machine intelligence is known to researchers as **narrow intelligence**.

There is little doubt among the community that artificial machines will be capable of intelligent thought in the near future. It's just a question of what and when... The machines may be pure silicon, quantum computers or hybrid combinations of manufactured components and neural tissue. As for the date, expect great things to happen within this century!

---

## How does Artificial Intelligence work?

### Technology...

There are many different approaches to Artificial Intelligence, none of which are either completely right or wrong. Some are obviously more suited than others in some cases, but any working alternative can be defended. Over the years, trends have emerged based on the state of mind of influential researchers, funding opportunities as well as available computer hardware.

**Over the past five decades, AI research has mostly been focusing on solving specific problems.** Numerous solutions have been devised and improved to do so efficiently and reliably. This explains why the field of Artificial Intelligence is split into many branches, ranging from Pattern Recognition to Artificial Life, including Evolutionary Computation and Planning.

---

## Who uses Artificial Intelligence?

### Applications...

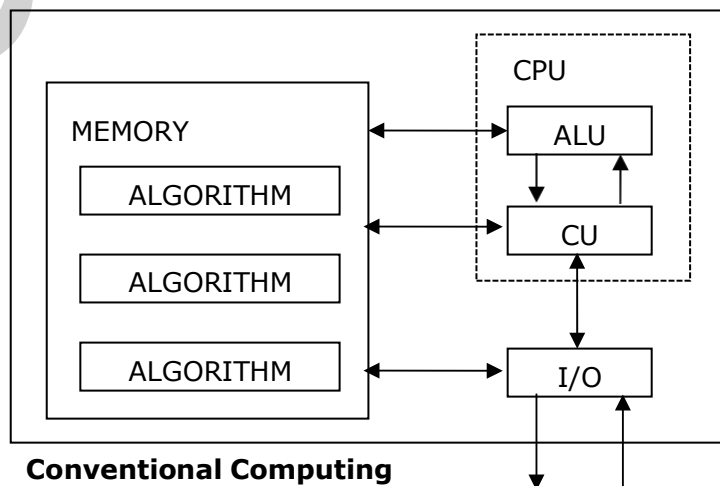
The potential applications of Artificial Intelligence are abundant. They stretch from the **military** for autonomous control and target identification, to the **entertainment industry** for computer games and robotic pets. Lets also not forget big establishments dealing with huge amounts of information such as hospitals, banks and insurances, who can use AI to predict customer behavior and detect trends.

As you may expect, the business of Artificial Intelligence is becoming one of the major driving forces for research. With an ever growing market to satisfy, there's plenty of room for more personnel. So if you know what you're doing, there's plenty of money to be made from interested big companies!

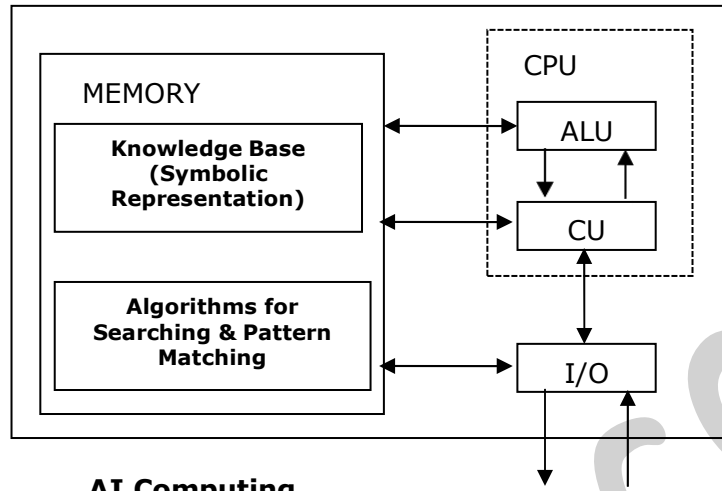
## DIFFERENCE BETWEEN AI COMPUTING AND CONVENTIONAL COMPUTING

CONVENTIONAL COMPUTING	AI COMPUTING
We tell the computer how to solve the problem. $a=3, b=5, c=a+b$	In AI we tell the computer what the problem is but not how to solve it. Add, 3,5
The computer is given data and a step by step program that specifies how the data is to be used to reach the answer.	The computer is given knowledge about the problem subject area plus some inferencing capability. e.g. 3.33, 3.67, ..., maths, cgpa
Conventional computer programs are based on algorithm, a clearly defined, step-by-step procedure for solving a problem.	We do not tell the computer specially how to solve the problem. Instead, the computer and software determine the method of arriving at a solution.
The algorithm is converted into a computer program, a sequential list of instructions or commands that tell the computer exactly what operations to carry out.	AI software is not based on an algorithmic process. Instead, it is based on symbolic representation and manipulation. For storing data knowledge base and for searching inferencing techniques are provided.

### COMPUTER



# COMPUTER



AI Computing

cs/learners.com