

# CSE3013 Artificial Intelligence

## Module-1: Introduction, Application and Evolution of AI

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SCOPE

# Introduction

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# Why to study AI?

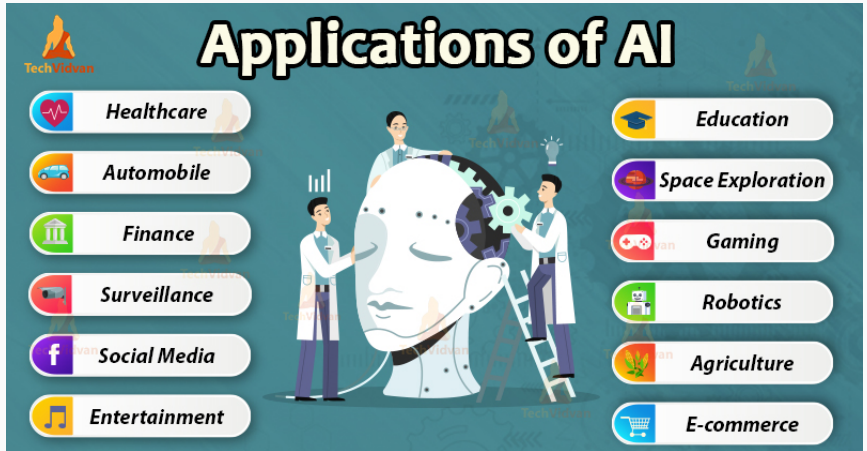


**Why learn Artificial Intelligence?**

The infographic features a central illustration of a man in a white shirt and tie, looking confused with his hand on his head and two question marks above him. To his right, a list of six benefits of AI is presented in dark blue rounded rectangles, each accompanied by a colorful icon. The background is light purple with several 'Data Flair' logos scattered throughout.

- Lucrative Career** (Icon: Person running up a red arrow)
- Versatile Nature** (Icon: Three arrows in a circular cycle)
- Skill of Century** (Icon: Person with a brain and neural connections)
- Ingests Large Amount of Data** (Icon: Computer monitor displaying a bar chart)
- Enhances User Experience** (Icon: Smartphone)
- Improved Disaster Management** (Icon: Green globe with a purple lightning bolt)

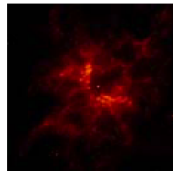
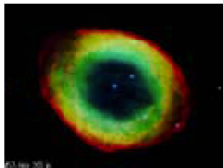
Source: Data Flair



Source: Tech Vidvan

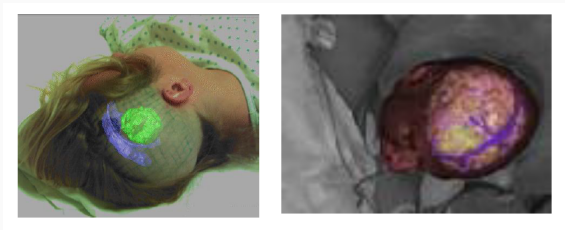
# Specific Applications(1/5)

- Autonomous planning and scheduling
  - Autonomous rovers
  - Analysis of data



## Specific applications (2/5)

- Medicine
  - Image guided surgery



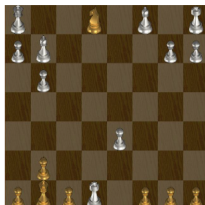
## Specific applications (3/5)

- Transportation:
  - Autonomous vehicle control
  - Pedestrian detection:



# Specific applications (4/5)

- Gaming





# Specific applications (5/5)

- Robotic toys



# Importance of AI

- AI automates repetitive learning and discovery through data
  - AI performs frequent, high-volume, computerized tasks, reliably and without fatigue.
- AI analyzes more and deeper data
  - Big data, neural networks, deep learning
- AI adds intelligence to existing products
  - Virtual assistants (Siri, Google assistant, Alexa)
- AI achieves incredible accuracy
- AI adapts through progressive learning algorithms
- AI gets the most out of data.
- Attempts to build intelligent entities

Source: [sas.com](https://sas.com)

# Definitions of AI

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## Defining AI (1/3)

- AI is a branch of computer science, aim on building machines and software with intelligence similar to humans.
- The aim is that: they can perform similar thinking, reasoning, decision-making, problem solving and natural language processing like human.
- Thinking like humans
  - Machines with minds -(Haugeland, 1985)
  - Automation of “decision making, problem solving, learning. . .” -(Bellman, 1978)

## Defining AI (2/3)

- Acting like humans
  - Functions that require intelligence when performed by people -(Kurzweil, 1990)
  - Making computers do things people currently do better -(Rich & Knight, 1991)
- Thinking rationally
  - Computational models of mental faculties -(Charniak & McDermott, 1985)
  - Computations that make it possible to perceive, reason, and act -(Winston, 1992)

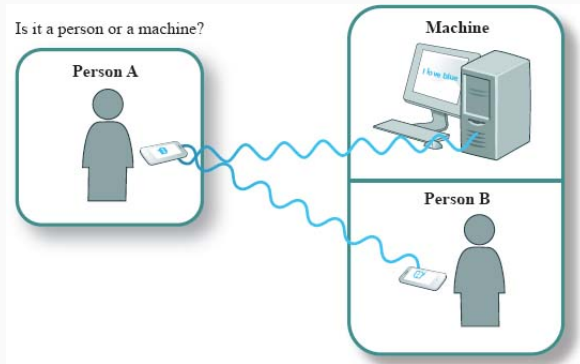
- Acting rationally
  - Explaining, emulating intelligent behavior via computation -(Schalkoff, 1990)
  - Branch of CS: automating intelligent behavior -(Luger, 2005)

# Definitions of AI

1. Acting humanly
2. Thinking humanly
3. Thinking rationally
4. Acting rationally

# The Turing test

- Turing (1950): "Can machines think?" / "Can machines behave intelligently?"
- Designed Operational test for intelligent behavior: -  
**Imitation Game**





# Acting humanly (1/2)

- The Turing test approach
  - 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.
- The computer would need to possess the following capabilities:
  - **natural language processing** to enable it to communicate successfully
  - **knowledge representation** to store what it knows or hears
  - **automated reasoning** to use the stored information to answer questions and to draw new conclusions
  - **machine learning** to adapt to new circumstances and to detect and extrapolate patterns

## Acting humanly (2/2)

- Turing's test avoids direct physical interaction between the interrogator and the computer
- Because physical simulation of a person is unnecessary for intelligence.
- **total Turing Test** includes a video signal so that the interrogator can test the subject's perceptual abilities
- It gives the opportunity for the interrogator to pass physical objects to the computer
- To pass the total Turing Test, the computer will need:
  - **computer vision** to perceive objects, and
  - **robotics** to manipulate objects and move about
- These six disciplines compose most of AI

# Thinking humanly: The cognitive modeling approach

- Programs with cognitive skills- thinking, remembering, reasoning
- Cognitive science
  - The interdisciplinary field
  - Brings together computer models from AI and experimental techniques from psychology to construct precise and testable theories of the human mind.

# Thinking rationally: The “laws of thought” approach

- Based on the field of **logic**
- Syllogism
  - A form of reasoning in which a conclusion is drawn from two given or assumed propositions (premises)
- By 1965, programs existed that could solve any solvable problem described in logical notation.
- If no solution exists, the program might loop forever.
- The so-called **logicist** tradition within artificial intelligence hopes to build on such programs to create intelligent systems.

# Acting rationally: The rational agent approach

- **Agent:** just something that acts
- Computer agents are expected to do more
  - operate autonomously
  - perceive their environment
  - persist over a prolonged time period
  - adapt to change
  - create and pursue goals.
- **Rational agent** is one that acts so as to achieve the best outcome or, when there is uncertainty, the best expected outcome.

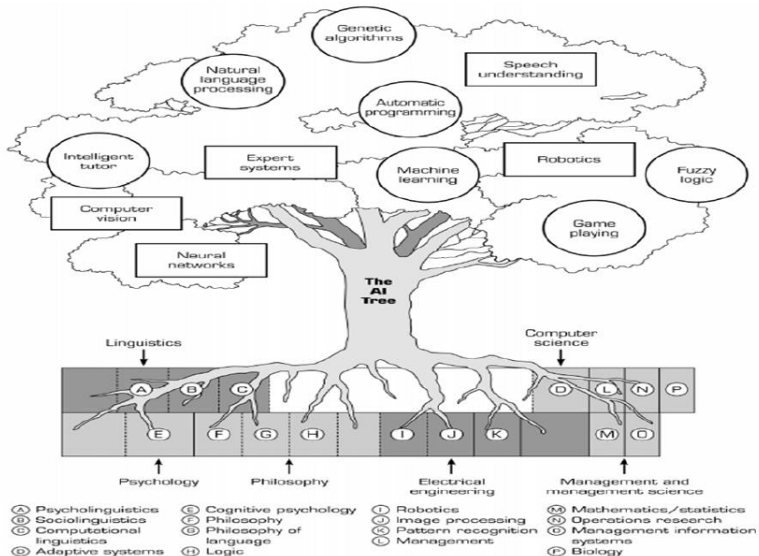
# Evolution of AI

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# Fields contributed to AI

- Philosophy: Rationalism, dualism etc.
- Mathematics: Algorithm, tractability, NP-Completeness etc.
- Economics: Game theory, operations research etc.
- Neuroscience: Neurons,
- Psychology: Behaviorism, Cognitive psychology
- Computer engineering
- Linguistics

# Disciplines of AI- The AI tree





- Reading assignment

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\vspace{-1cm}\begin{center}{\tiny Source: Tech  
Vidvan}\end{center}
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