Introduction to AI

Module I

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CONTENTS

- Introduction
- Definition
- Applications of AI
- Advantages and Disadvantages
- Growth and Future of AI
- Conclusion
- Bibliography

Introduction

- Intelligence : “The capacity to learn and solve problems.”

- Artificial Intelligence : Artificial Intelligence (AI) is the simulation of human intelligence by machines.
  1) The ability to solve problems.
  2) The ability to act rationally.
  3) The ability to act like humans.

- The central principles of Al include :
  1) Reasoning, knowledge, planning, learning and communication.
  2) Perception and the ability to move and manipulate objects.
  3) It is the science and engineering of making intelligent machines, especially intelligent computer programs

Definition

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- Artificial intelligence, or AI, is technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.

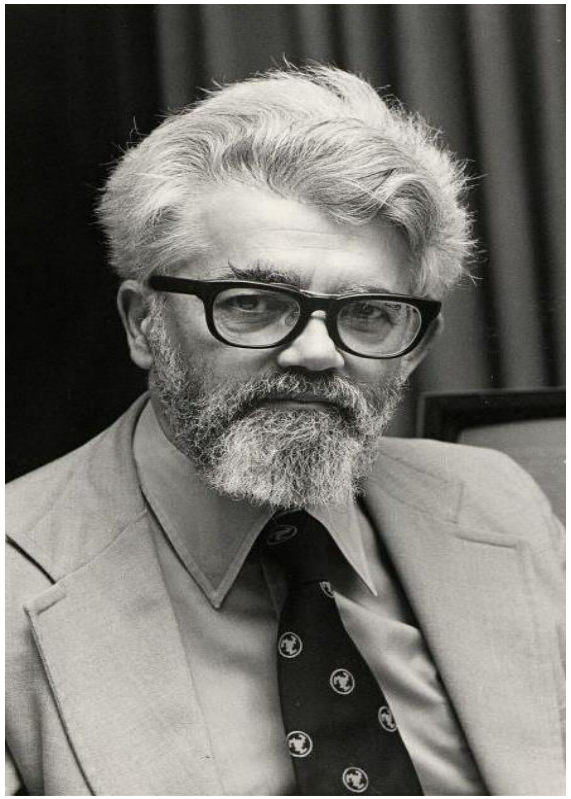
- AI is a broad field that encompasses many different disciplines, including computer science, data analytics and statistics, hardware and software engineering, linguistics, neuroscience, and even philosophy and psychology.

- Artificial Intelligence (AI) enables machines to learn from experience, adapt to new inputs, and execute tasks resembling human capabilities. By leveraging AI technologies, computers can undergo training to perform particular tasks through the analysis of extensive data sets and the identification of patterns within the data.

- AI is the branch of computer science that is concerned with the automation of intelligent behaviour.

History of AI

- Fast forward to 1935, when the earliest substantial work in this field was done by Alan Turing, a logician and computer pioneer.
  - Turing Machine
- 1951: Christopher Strachey wrote the first successful AI program
  - Computer checkers program
- 1956: John McCarthy coined the term Artificial Intelligence
- 1963: ANALOGY, a program created by Thomas Evans, proved that computers can solve IQ test analogy problems



History of AI

- 1967: First successful knowledge-based program in science and mathematics
- 1972: SHRDLU created by Terry Winograd
  - Robot arm responded to commands
- 1987: Marvin Minsky publishes *The Society of Mind*, which portrays the brain as a series of cooperating agents
- 1997: A chess program, Deep Blue, beats the world chess champion, Gary Kasparov
- 2000's: Interactive robot smart toys are made commercially available

Application of AI in Medicine

- A medical clinic can use AI systems to organize bed schedules, make a staff rotation and provide medical information.

- AI has also application in fields of cardiology (CRG), neurology (MRI), embryology (sonography), complex operations of internal organs, etc

- It also has an application in Image guided surgery and image analysis and enhancement.

Applications of AI in Music

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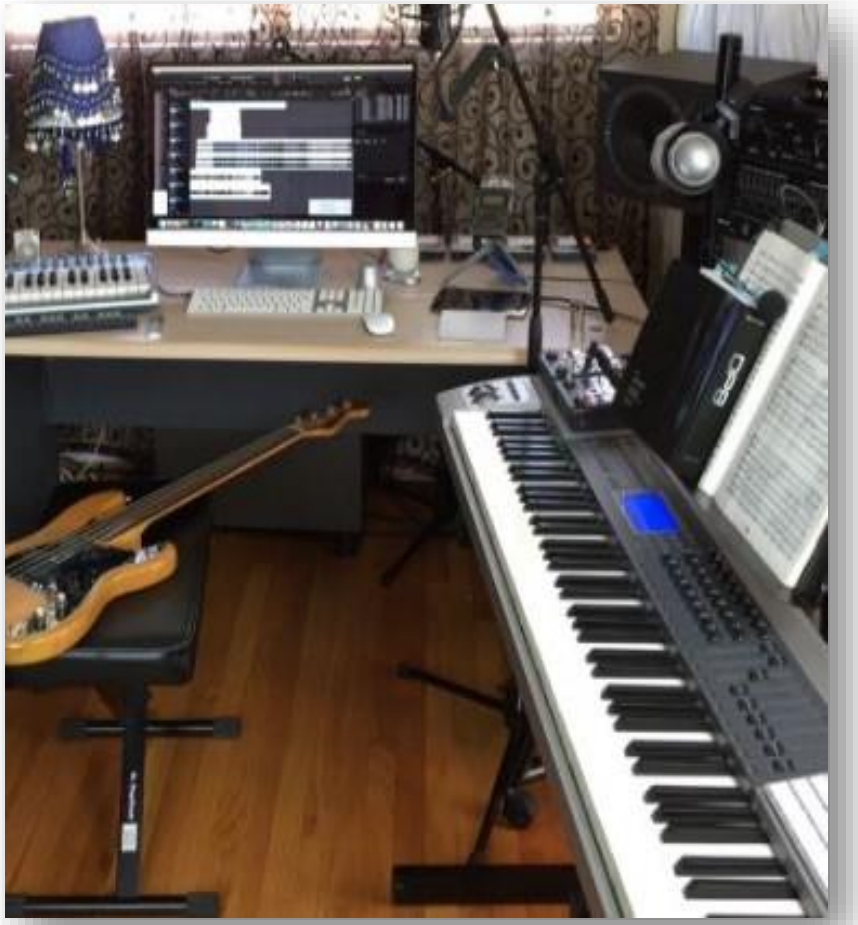
- Scientists are trying to make the computer emulate the activities of the skillful musician.

- Composition, performance, music theory, sound processing are some of the major areas on which research in music and AI are focusing on.

  Eg : chucks, smartmusic, etc.



Application of AI in Telecommunications

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- Many telecommunications companies make use of heuristic search in the management of their workforces.

- For example BT Group has deployed heuristic search in a scheduling application that provides the work schedules of 20000 engineers.

Robotics and AI

- A ROBOT is a mechanical or virtual artificial agent, usually an electro mechanical machine that is guided by a computer program or electronic circuitry.
- Robots can be autonomous or semi-autonomous.
- A robot may convey a sense of intelligence or thoughts of its own.

Application of AI in Gaming

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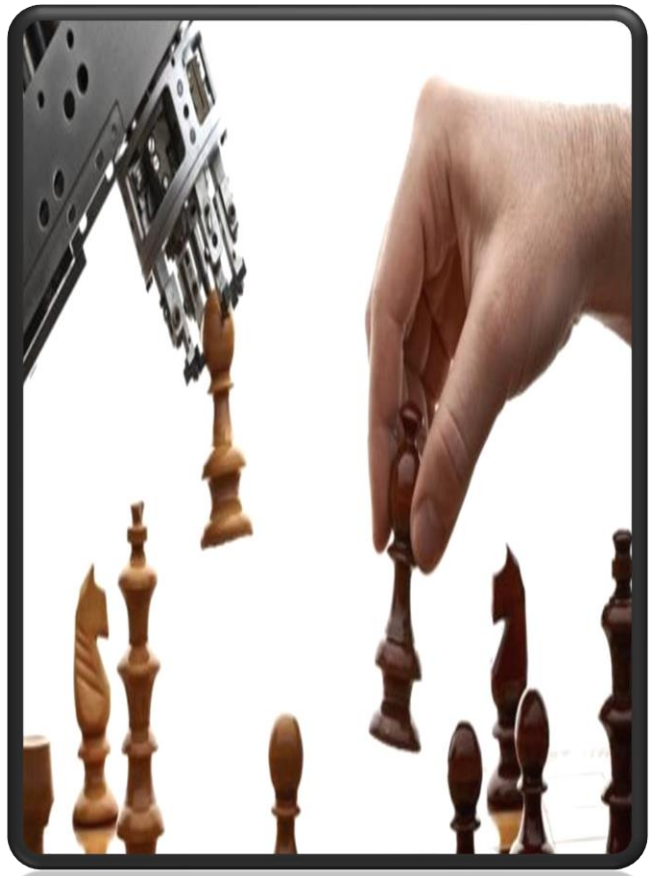
- In the earlier days gaming technology was not broadened.

- Physicist Willy Higinbotham created the the first video game in 1958.

- It was called "Tennis For Tow" and was oscilloscope.

- But, now AI technology has become vast and standard has also been increased.

- For Eg : Sudoku, Fear, Fallout, etc

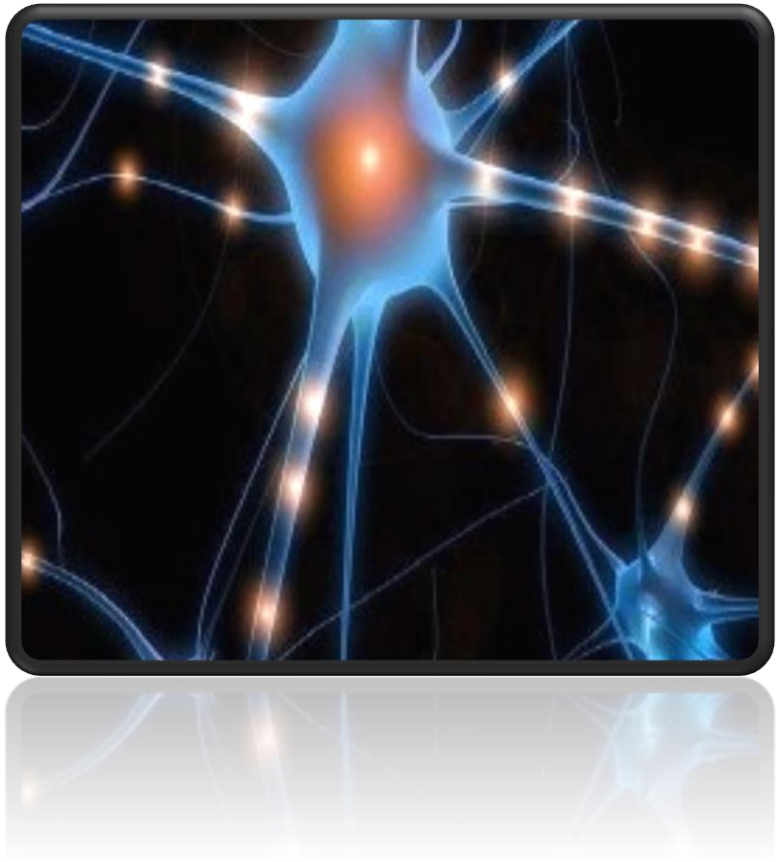


Applications of AI in Banking

- Organize operations, invest in stocks, and manage properties.
- In August 2001, robots beat humans in a simulated financial trading competition.
- Some other applications include loan investigation, ATM design, safe and fast banking, etc.

Some Other Applications

- Credit granting
- Information management and retrieval
- AI and expert systems embedded in products
- Plant layout
- Help desk and assistance
- Employee performance evaluation
- Shipping
- Marketing
- Warehouse optimization
- In space workstation maintainance
- Satellite controls
- Network developments
- Nuclear management



Artificial Intelligence

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- Advantages :
  - Eliminates human error and risk.
  - 24/7 availability.
  - Solving new problems.
  - Unbiased decision making.
  - Repetitive jobs.
  - Cost reduction.
  - Data acquisition and analysis

- Disadvantages :
  - Costly implementation
  - Lack of emotion and creativity
  - Degradation over time
  - AI can’t naturally learn from its own experience and mistakes.
  - Reduced jobs for humans
  - Ethical problems

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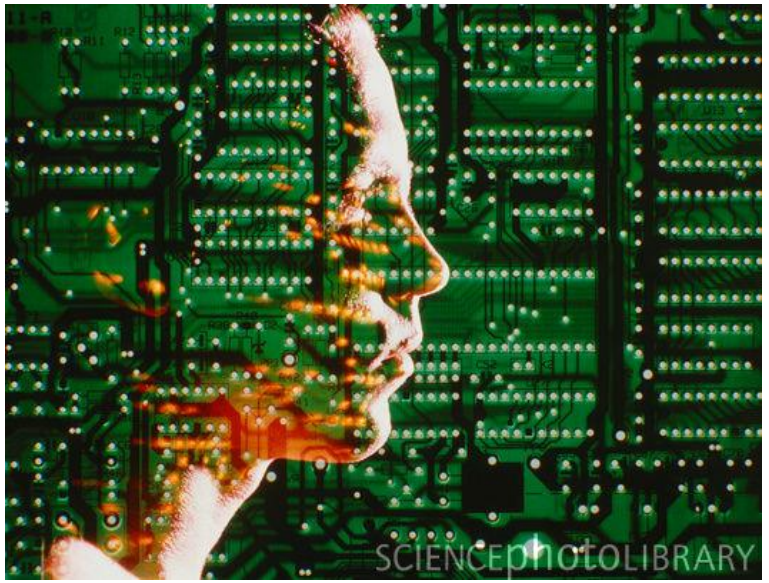
Future of AI

- Right now, A.I. is at level comparable to less intelligent animals or insects.
- Is it possible to go farther, to reach human intelligence?



Future of AI

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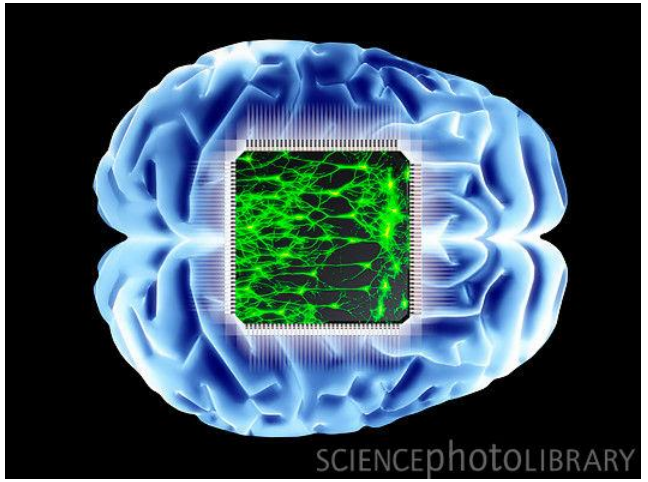
- 2050: Estimated date of the emergence of the Singularity, or greater-than-human super-intelligence.
- At this point, it's thought that certain machines will exceed the human brain in terms of intelligence
- It's believed that this breakthrough will lead to a rapid advancement in technology, as super intelligent A.I. designs new computers and machines at a rate no human could do.



Humanoid Robot and AI

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- Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics.
- Sophia was activated on April 19,2015.
- She made her first public appearance at South by Southwest Festival in mid-March 2016 in United States.
- In October 2017 Sophia became a Saudi Arabian citizen, the first robot to receive citizenship in any country.

Strong A.I.

- Strong A.I. is intelligence that matches or exceeds that of human intelligence
- Ultimate goal of A.I. research
- Weak A.I. is narrow/more focused than strong A.I.
- Whole Brain emulation- Mapping and re-creating the human brain through neuro- imaging

Problems with A.I.

- One basic problem lies in the question of what intelligence is exactly.
- How can we recreate a learning, thinking mind with technology? Is it even possible?
- David Gelernter, a Yale professor, says A.I. is “lost in the woods”.

Problems with A.I.

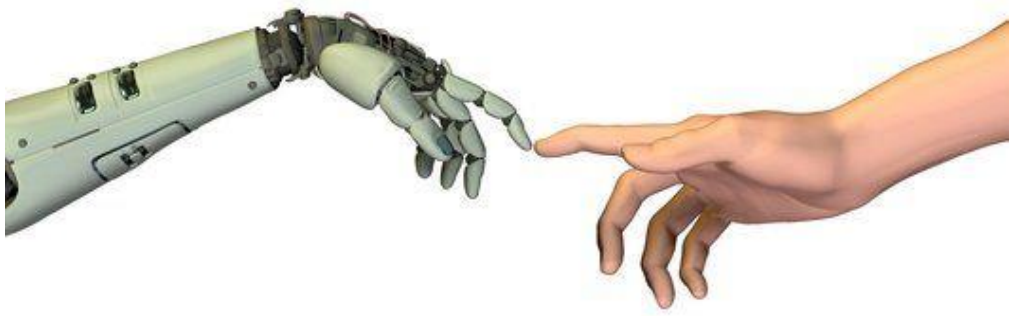
- What is the human conscious? Gelernter argues that we can't construct a conscious A.I. without even knowing what exactly the conscious is.

- "Without this cognitive continuum, AI has no comprehensive view of thought: it tends to ignore some thought modes (such as free association and dreaming), is uncertain how to integrate emotion and thought, and has made strikingly little progress in understanding analogies--which seem to underlie creativity."

Problems with A.I.

- Scientists need to figure out the “algorithms of thought”, basically a way to mathematically simulate the human thought process.

- The human brain relies on chemistry and physics of different molecules in order to function. How could scientists ever replicate this process?



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Questions

- Do you believe that A.I. *should* be taken any further?
- If machines can be made to think like us, then what do you think sets us apart as humans? At what point is a machine considered life?
- If we were to create intelligent beings, what kind of rights would they be given? Should they even be given rights?