Artificial Intelligence

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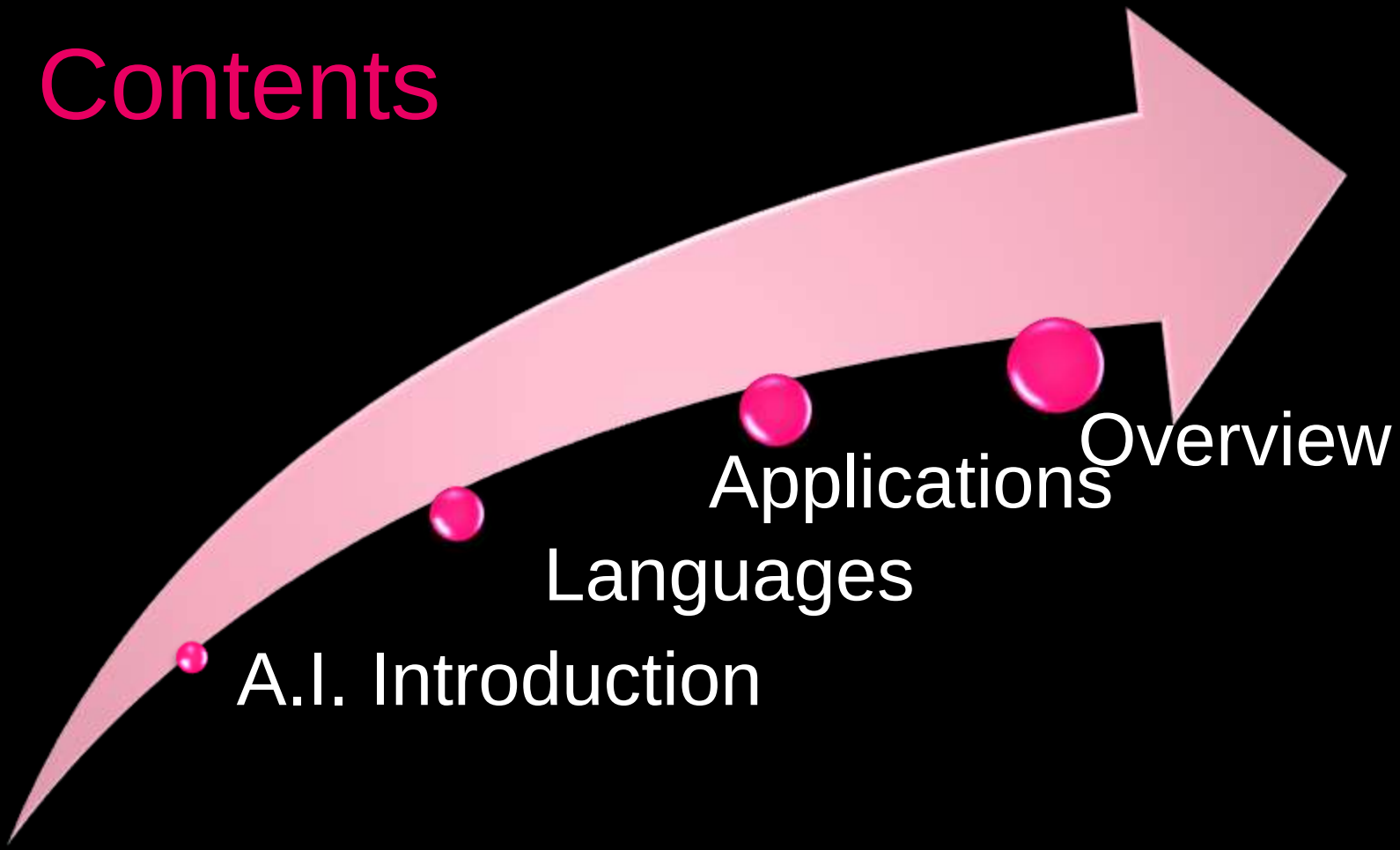
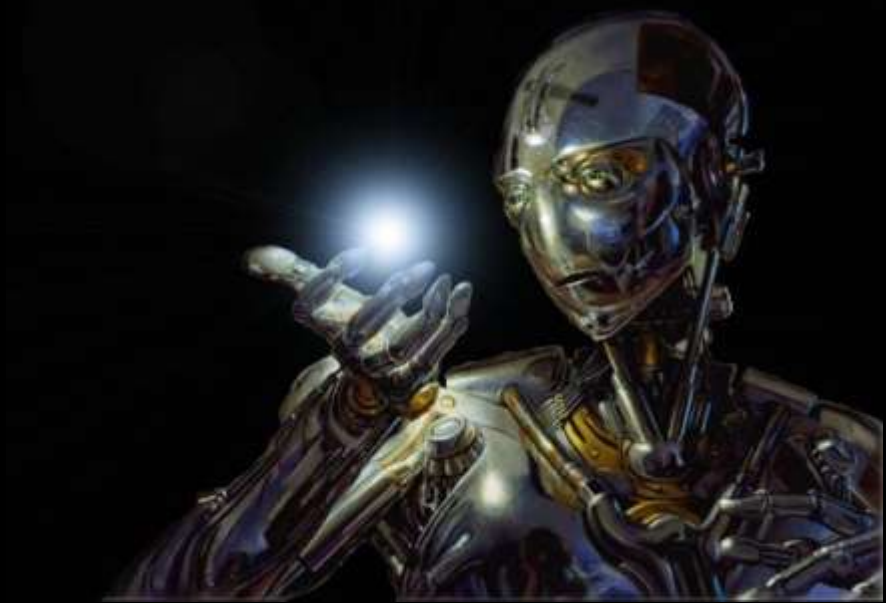


Introduction

Claiming to be able to recreate the capabilities of the human mind, is both a challenge and an inspiration for philosophy.

- It is the science and engineering of making intelligent machines, especially intelligent computer programs.



Are there limits to how intelligent machines can be?

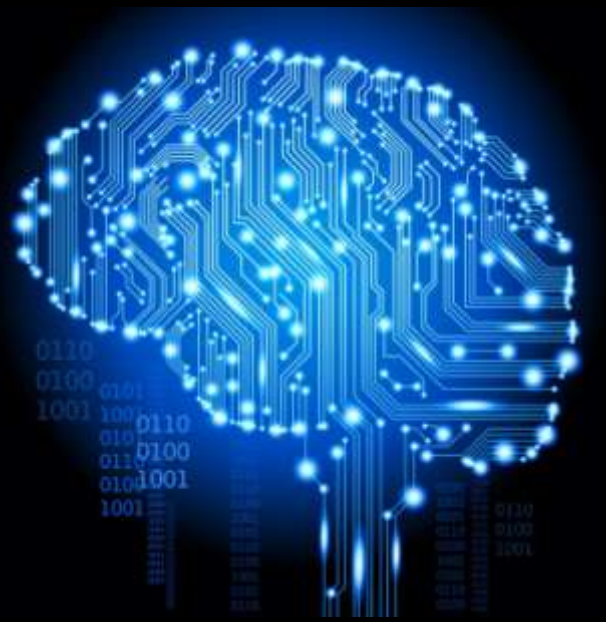
- Intelligence:

"the capacity to learn and solve problems"

- Artificial Intelligence:
  - Artificial intelligence (AI) is the intelligence of machines and robots and the branch of computer science that aims to create it
    - the ability to solve problems
    - the ability to act rationally
    - the ability to act like humans

Philosophy of A.I.

- Searle's strong AI hypothesis: "The appropriately programmed computer with the right inputs & outputs would thereby have a mind in exactly the same sense human beings have minds."
- The artificial brain argument: The brain can be simulated.
- Technologically feasible to copy the brain directly into hardware and software, and that such a simulation will be essentially identical to the original.



History of artificial intelligence

- Classical philosophers
- Programmable Digital Computers (1940)
- 1943-1956:
- McCulloch & Pitts: Boolean circuit model of brain
- Dartmouth meeting: "Artificial Intelligence“ name adopted
- **The golden years 1956−1974**

- 1986-- Rise of machine learning
  - Neural networks return to popularity
  - Major advances in machine learning algorithms and applications
- 1995-- AI as Science
  - Integration of learning, reasoning, knowledge representation
  - AI methods used in vision, language, data mining, etc

- 2006: face recognition software available in consumer cameras
- 2003-2007 Robot driving: DARPA grand challenge

- Feb 2011 there came question answering robot.


Can AI System
Work As
Efficient As
Human
Brain22222

- How complicated is our brain?
  - Neuron
  - 10^{12} neurons in a human brain
  - many more synapses (10^{14}) connecting these neurons
  - cycle time: 10^{-3} seconds (1 millisecond)
- How complex can we make computers?
  - 10^{8} or more transistors per CPU
  - supercomputer: hundreds of CPUs, 10^{12} bits of RAM
  - cycle times: order of 10^{-9} seconds
- Conclusion
  - ❖YES
  - Less interconnections (wires or synapses)

Languages

Artificial intelligence researchers have developed several specialized programming languages for artificial intelligence which include IPL, Lisp, Prolog, STRIPS, Planner, POP-11 etc.

LISP (Introduction)

Lisp is a family of computer programming languages with a long history and a distinctive, fully parenthesized Polish prefix notation.

The name LISP derives from "List Processing". Linked lists are one of Lisp languages' major data structures, and Lisp source code is itself made up of lists. As a result, Lisp programs can manipulate source code as a data structure, giving rise to the macro systems that allow programmers to create new syntax or even new domain-specific languages embedded in

LISP (Syntax & Semantics)

Lisp is an expression-oriented language. Unlike most other languages, no distinction is made between "expressions" and "statements"; all code and data are written as expressions. McCarthy's 1958 paper introduced two types of syntax:

- S-expressions (Symbolic expressions)

  (car (cons A B))

- M-expressions (Meta Expressions)

  car[cons[A,B]]

LISP connection to A.I.

- LISP is an important language for artificial Intelligence programming.
- LISP programs define how to perform an algorithm on the expressions.
- Frames, networks and objects are responsible for LISP's popularity in the AI community.
- Lisp is widely used in implementing the tools of Artificial Intelligence.

PROLOG (Introduction)

Prolog is a general purpose logic programming language associated with AI and computational linguistics.

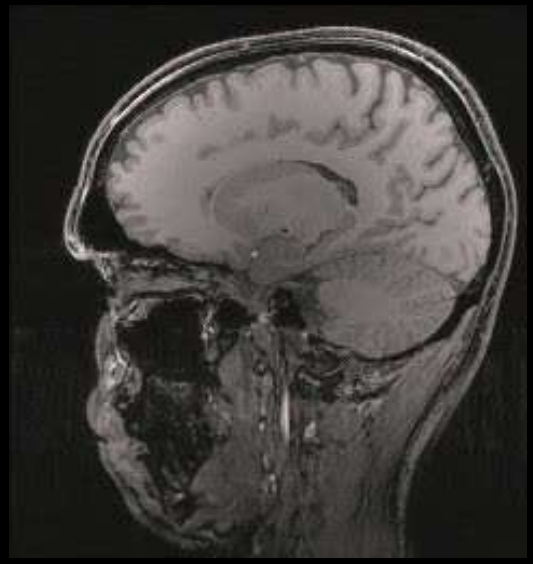
Prolog has its roots in first-order and formal logic. It is declarative and expressed in terms of relations, represented as facts and rules.

PROLOG (Syntax & Semantics)

In Prolog, program logic is expressed in terms of relations, and a computation is initiated by running a query over these relations.

In syntax and semantics following are considered:

- Data types
- Rules and facts
- Evaluation
- Loops
- Negation



PROLOG (Data Types)

- An atom, whose meanings is not defined.
- Numbers can be floats or integers.
- Variables are strings consisting of letters, numbers and underscore characters, and beginning with an upper-case letter or underscore(_).

Comparison

LISP

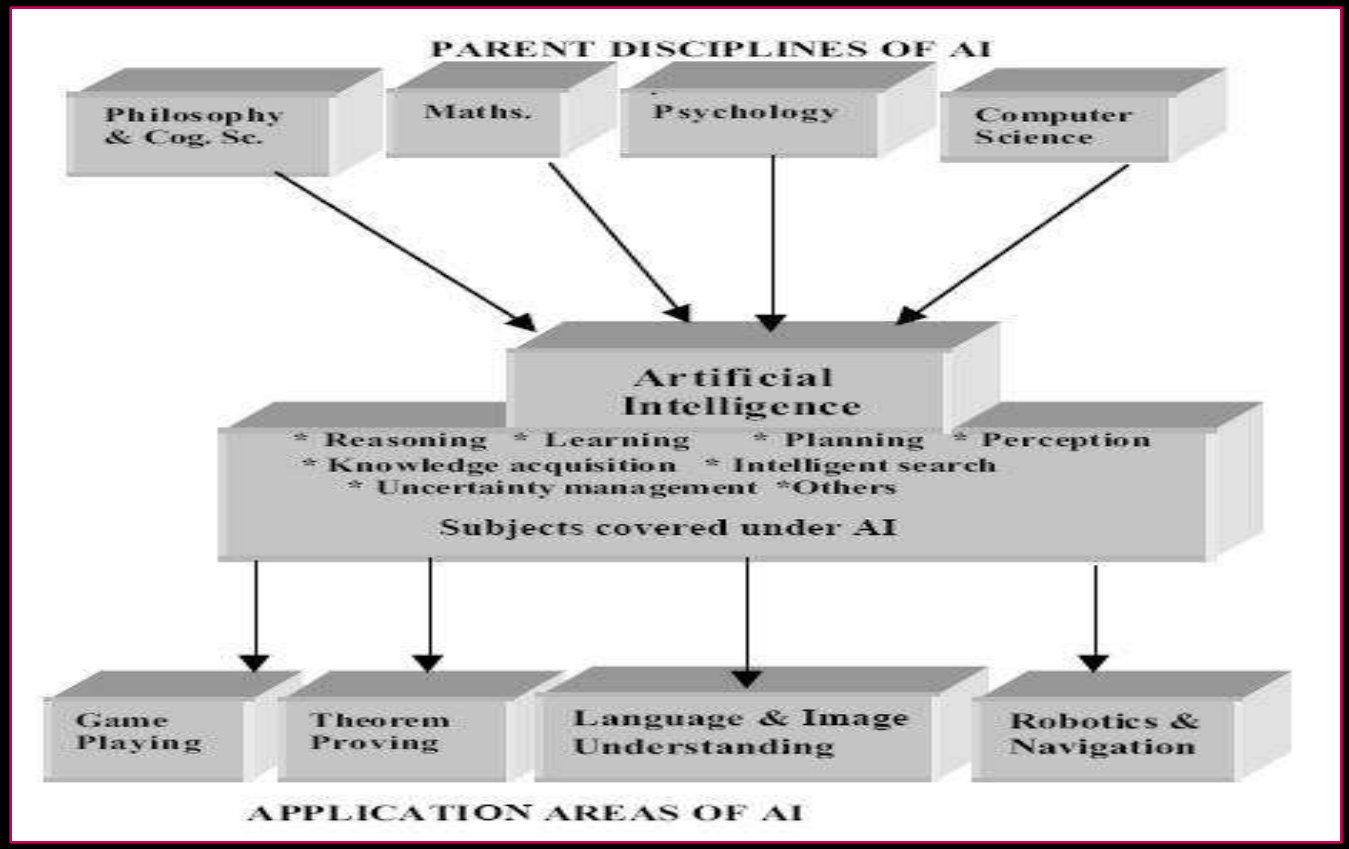
- Functional language
- General purpose
- Handles wide variety of tasks, easier to use
- Dn’t support compared to prolog

PROLOG

- Logical language
- Specific uses
- Smaller language, easier to learn
- Supports multidirectional reasoning

Parent disciplines of AI:

It is a broad field with so many subareas.



Applications of AI:

- Natural Language Understanding
- Expert Systems
- Planning and Robotics
- Machine Learning
- Game Playing

Natural Language Processing

- To design and build software that will analyze understand and generate languages that human use naturally.

Modes of communication

- Text based.

- Dialogue based.

Speech Recognition

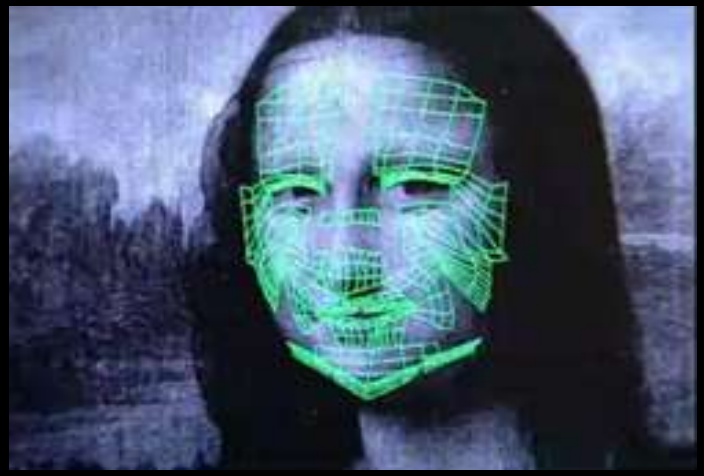
- Process of converting sound signal captured by microphone or mobile/telephone to a set of words.

- 70-100 words / min with accuracy of 90%

Computer Vision

- Ability of a machine to extract information from an image that is necessary to solve a task

- Image Acquisition
- Image Processing
- Image Analysis
- Image understanding

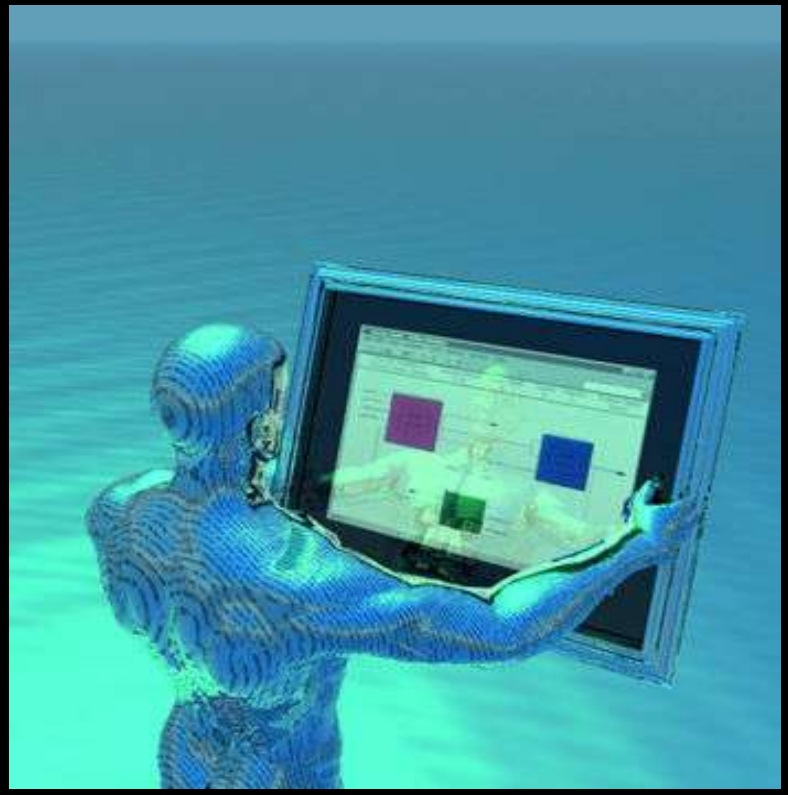


Intelligent Robot

- Tend to mimic human sensing and decision making abilities so that they can adopt themselves to certain conditions and modify their actions.

Expert Systems

- These are Softwares used for decision making .
- Automated Reasoning and Theorem Proving.
- Troubleshooting Expert Systems.
- Stock Market Expert System.



Artificial Intelligence the need of hour

- "Many thousands of AI applications are deeply embedded in the infrastructure of every industry."
- The late 90s and early 21st century, AI technology became widely used as elements of larger systems, but the field is rarely credited for these successes.

Fields of AI

Computer science:

- Graphical User Interface
- Automatic Storage manageme
- Object Oriented Programming
- Data miming
- computer gaming

- Telecommunication:
- Automated Online Assistants
- Voice dialing
- Speech Recognization

Fields of AI

Aviation & Automation:

- NASA's fight research centre
- Voice recognition in fighter jets
- Directions to A.I pilots through air traffic controllers
- Automatic Gearing System in Cars

Fields of AI

Robotics:

- Assembling Robots
- Welding Robots
- Behavior based robotics
- Dancing Robots
- Robot navigation

Daily life applications

- Home Security
- Bank
- Post office
- Websites
- Digital cameras
- News and publishing
- Financial trades
- Health and medicine
- Games and toys

How AI is different????????

Artificial Intelligence	Natural Intelligence
Non Creative	Creative
Precise	May Contain Error
Consistency	Non Consistent
Multitasking	Can’t Handle

Drawbacks of A.I

- Limited Ability
- Slow Real Time Response
- Can’t Handle Emergency Situation
- Difficult code
- High Cost

Any Questions


Thanks