17 November 2023 20:30

A. K. Ghosh / 9874458577
akghsh.ece@gmail.com
Calculata

Artificial Intelligence

Total no of lecture : 12

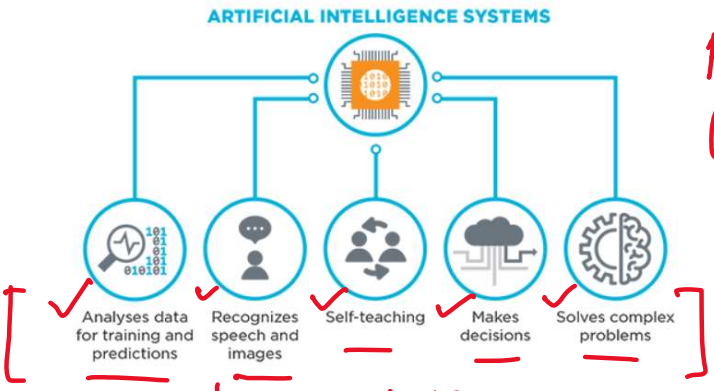
1 + 11 = ① Python
2 (Modules & Packages)
Data Analysis ② Maths
2 (Statistics)
③ Deep learning
7 Human brain Architecture
↳ Neural Network
(ANN, CNN, RNN)

- Introduction to python: Python basic, Python concepts & terms, Python fundamentals,Python data structure & modules.
- Introduction to data analysis : Pandas & visualization
- Statistics & probability: Introduction to probability, Distribution central limits theorem & hypothesis testing.
- AI Introduction: Introduction to Artificial intelligence, Applications of Artificial intelligence, Hands on work with Python.
- Deep learning: Introduction to Neuron deep learning (basics & scope), Evolution of deep learning, Applications of Deep learning, Machine learning Vs. Deep learning, Techniques & types of deep learning, Introduction to ANN.
- Artificial neural networks: Neuron Diagram, Neuron Models & NETWORK FUCTIONS, Functions of Neurons activation, Functions of Gradient descent &Stochastic, Ramp function & sigmoid function & Gaussian function.
- Network Installation: Perceptron & multilayer network, Backpropagation, Deep neural network installing libraries, Creating ANN, Python training the model.
- Convolutional neural networks: Introduction to open Cv (Image processing), Learning basic image manipulations, Introduction to CNN, CNN Institution, Convolution Operation pooling, Flattering building a CNN using python Training the model.

Hands-on Session:
1) * Google Colaboratory (online)
2) Anaconda 3 (offline) (Environments)

NLP → (LLM), Framework – TensorFlow, Pytorch, Keras.

Set of tasks T
Experience E
performance P
⟨T, E, P⟩ = learning & problem solving



'AI camera' 'AI voice assistant – Siri, Alexa"

AI agents (artificial intelligence mimicking human intelligence)

Artificial intelligence (**AI**), sometimes called **machine intelligence**, is intelligence demonstrated by machines, in contrast to the **natural intelligence** displayed by humans and other animals, such as "learning" and "problem solving. .

In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals.

AI agents
S/w H/w

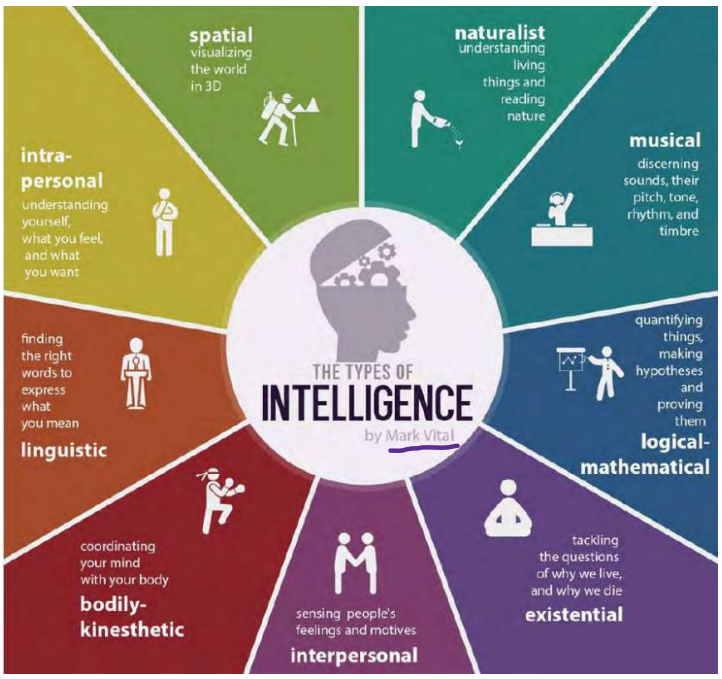
(DL) Robotics, Embedded Systems

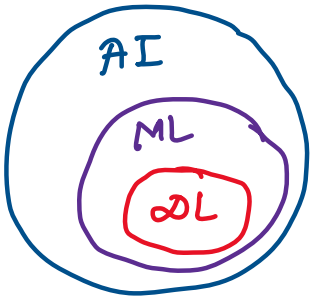
HOW ARE HUMANS INTELLIGENT ?

AI - data-driven technology

Data (forms)

→ text
→ images
→ video
→ table
⋮





Types
↳ Quantitative Data
↳ Qualitative Data

Time dependant data

Artificial intelligence (AI) - The study of computer systems that attempt to model and apply the intelligence of the human mind.

For example, writing a program to pick out objects in a picture:

This is what Humans do best

Can you list the items in this picture ?

A computer might have trouble identifying the cat there.

This is what Computers do best

Can you count the distribution of letters in a book?

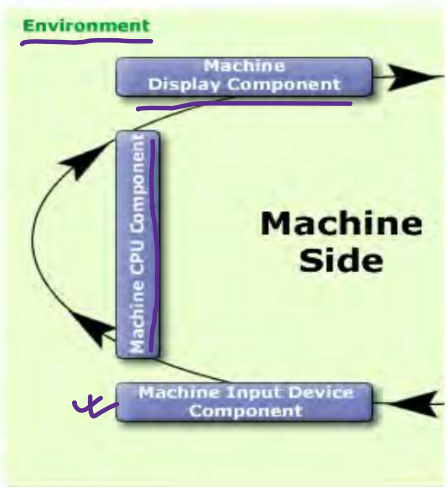
Add a thousand 4-digit numbers?

Match finger prints?

Search a list of a million values for duplicates?

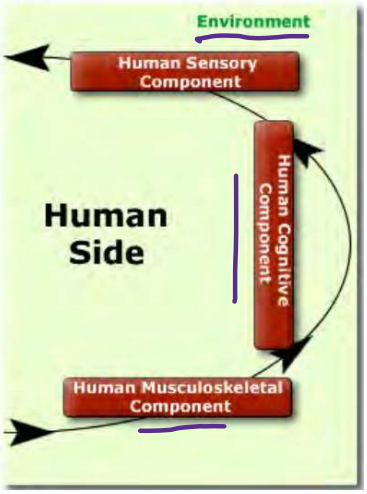
Machines are Better Than Humans in:

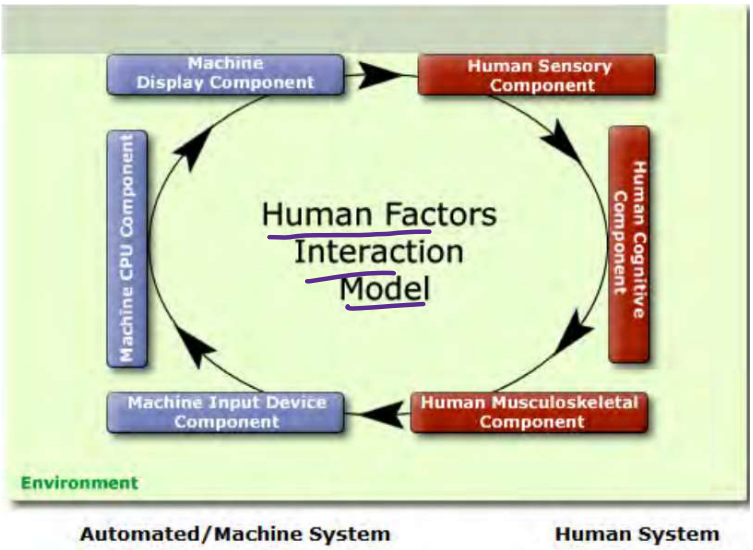
- Alertness
- Speed and Power
- Sensor Detection Outside Human Range
- Routine Work
- Computation
- Short-term Memory Storage
- Simultaneous Activities

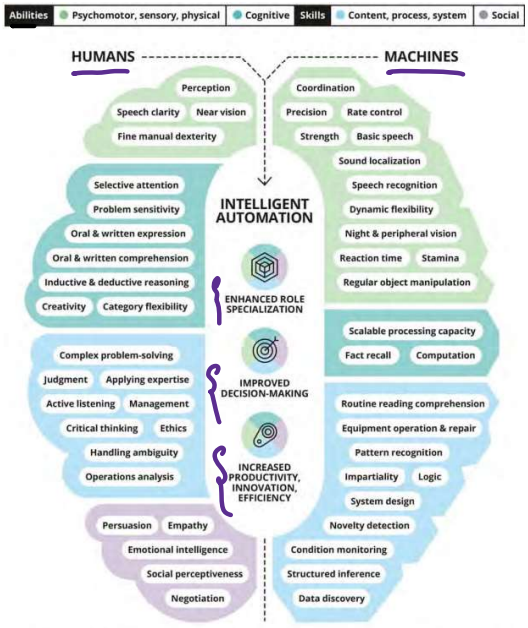


Humans are Better than Machines in:

- Sensory Functions
- Perceptual Abilities
  - Stimulus Generalization
  - Abstract Concepts
- Flexibility
  - Ability to Improvise
- Judgment
- Selective Recall
- Inductive Reasoning







Some Definitions

The exciting new effort to make computers think …
machines with minds,
in the full literal sense.

Haugeland, 1985

The study of mental faculties through the use of computational models.

Charniak and McDermott, 1985

A field of study that seeks to explain and emulate intelligent behavior in terms of computational processes.

Schalkoff, 1990

Intelligence:

- "the capacity to learn and solve problems" (Websters dictionary)
- in particular,
  - *the ability to solve novel problems*
  - *the ability to act rationally*
  - *the ability to act like humans*

Artificial Intelligence

- build and understand intelligent entities or agents
- 2 main approaches: "engineering" versus "cognitive modeling"

Robotics Neural Network

What is artificial intelligence?

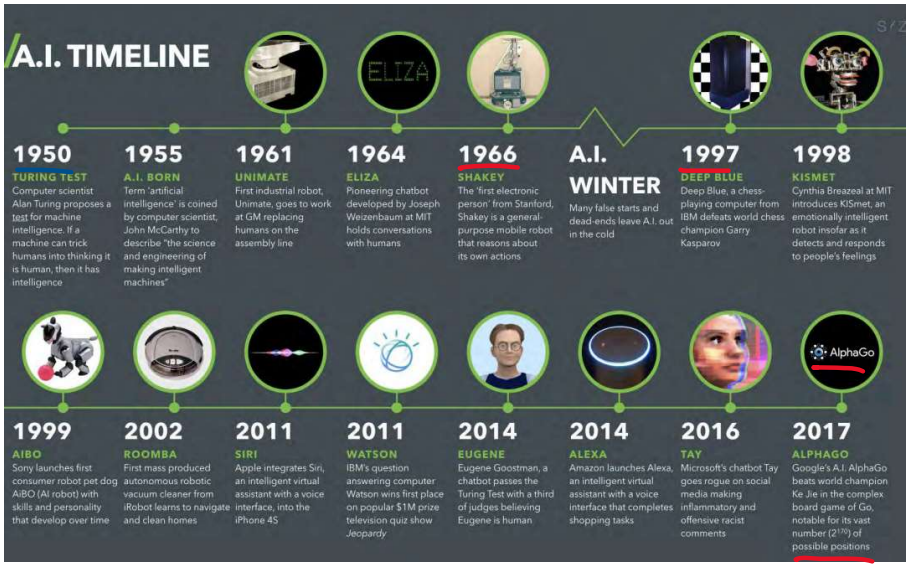
It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.

Capabilities of intelligent machines

- **Ability to interact with the real world**
  - to perceive, understand, and act
  - e.g., speech recognition and understanding and synthesis
  - e.g., image understanding
  - e.g., ability to take actions, have an effect
- **Reasoning and Planning**
  - modeling the external world, given input (data) → predictive model
  - solving new problems, planning, and making decisions
  - ability to deal with unexpected problems, uncertainties
- **Learning and Adaptation**
  - we are continuously learning and adapting → known newly generated data
  - our internal models are always being "updated"
    - e.g., a baby learning to categorize and recognize animals

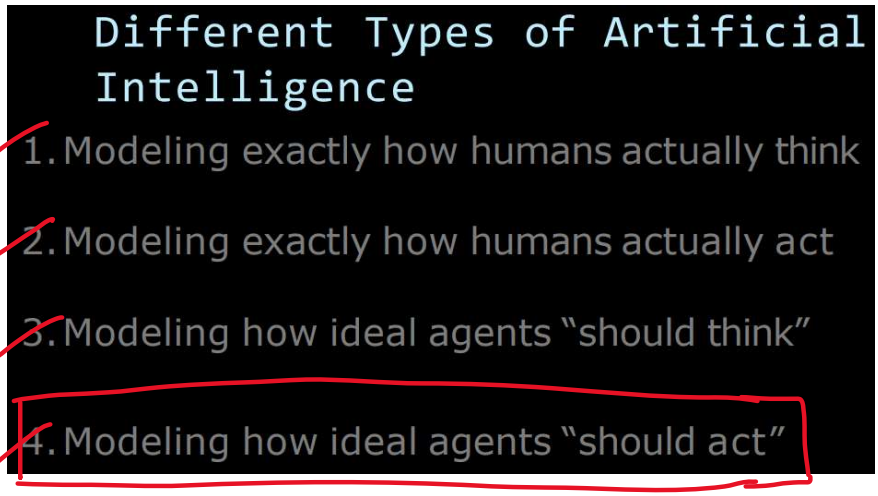
Reinforcement deep learning

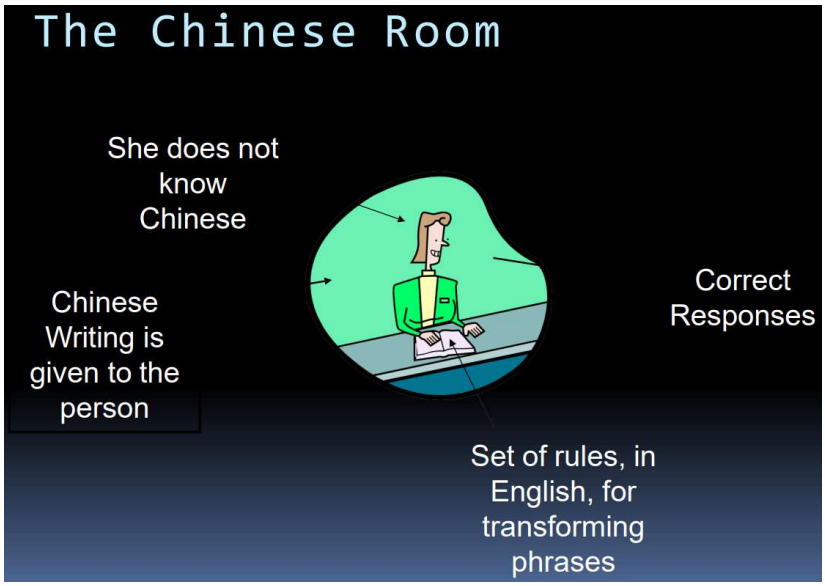
Alan N Turing



Turing Model

Checkers game





Applications of AI

· Gaming – AI plays important role for machine to think of large number of possible positions based on deep knowledge in strategic games. for example, chess,river crossing, N-queens problems and etc.

· Natural Language Processing – Interact with the computer that understands natural language spoken by humans.

· Expert Systems – Machine or software provide explanation and advice to the users.

· Vision Systems – Systems understand, explain, and describe visual input on the computer.

· Speech Recognition – There are some AI based speech recognition systems have ability to hear and express as sentences and understand their meanings while a person talks to it. For example Siri and Google assistant.

· Handwriting Recognition – The handwriting recognition software reads the text written on paper and recognize the shapes of the letters and convert it into editable text.

· Intelligent Robots – Robots are able to perform the instructions given by a human.