INTRODUCTION

Unit: 1

Artificial Intelligence(KCS071)

B Tech 7th Sem

Renuka Sharma

CSE Department

Brief Introduction About Me

Renuka Sharma

Designation: Assistant Professor CSE Department

NIET Greater Noida

Qualification:

B.Tech(CSE) from Ch. Devilal University ,Sirsa in 2013

M.tech(CSE) from AKTU Lucknow in 2017

Total Experience: 4

Research Publication:

particulars	journals	conferences
International	04	0
National	0	0

Evaluation Scheme

B.TECH

(COMPUTER SCIENCE & ENGINEERING/CS) CURRICULUM STRUCTURE

SEMESTER- VII													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU701/KHU702	HSMC -1 / HSMC-2	3	0	0	30	20	50		100		150	3
2	KCS07X	Departmental Elective-IV	3	0	0	30	20	50		100		150	3
3	KCS07X	Departmental Elective-V	3	0	0	30	20	50		100		150	3
4	KOE07X	Open Elective-II	3	0	0	30	20	50		100		150	3
5	KCS751A	The Department may conduct one Lab of either of the two Electives (4 or 5) based on the elective chosen for the curriculum. The Department shall on its own prepare complete list of practical for the Lab and arrange for proper setup and conduct accordingly.	0	0	2				25		25	50	1
6	KCS752	Mini Project or Internship Assessment*	0	0	2				50			50	1
7	KCS753	Project	0	0	8				50		100	150	4
8		MOOCs (Essential for Hons. Degree)											
		Total	**12**	**0**	**12**							**850**	**18**

*The Mini Project or internship (4 - 6 weeks) conducted during summer break after VI semester and will be assessed during VII semester.

Branch wise Application

- AI is the study of computer science that focuses on devising machines or developing software that exhibits human behaviour.

- Examples of Artificial Intelligence / applications of AI : **Medical, Banking, Security, Image/Video pattern detection,** translation between languages.

- AI Scope: Machine Learning and Deep Learning.

Content

Branch wise Application

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- AI Scope: Machine Learning and Deep Learning.

Course Objectives

CO1	To introduce the foundation & application of AI
CO2	To have an understanding of basic issues of Blind and heuristic search
CO3	An understanding of the main abstractions and reasoning techniques used in AI
CO4	Understanding of machine learning
CO5	Understanding pattern recognition

Course Outcome

COURSE	COURSE OUTCOME NO.	COURSE OUTCOMES At the end of the semester, the student will be able to:
KCS071 (Artificial Intelligence)	KCS071.1	Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents
	KCS071.2	Understand search techniques and gaming theory.
	KCS071.3	The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.
	KCS071.4	Student should be aware of techniques used for classification and clustering.
	KCS071.5	Student should aware of basics of pattern recognition and steps required for it.

CO-PO and PSO Mapping

- **CO-PO correlation matrix**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KCS071.1	3	2	2	2	2	1	1	2	1	1	2	2
KCS071.2	3	3	2	4	2	2	2	1	2	2	2	2
KCS071.3	2	2	3	2	3	2	1	2	2	2	2	2
KCS071.4	2	3	2	3	2	2	1	2	2	2	2	2
KCS071.5	2	2	2	2	2	2	2	1	2	2	1	3

- **CO-PSO correlation matrix**

	PSO1	PSO2	PSO3	PSO4
KCS071.1	3	2	2	2
KCS071.2	3	2	2	2
KCS071.3	3	2	3	2
KCS071.4	2	2	3	2
KCS071.5	2	1	1	1

Result Analysis

Artificial Intelligence	Course Outcomes
Department Wise	98.3%
Subject Result	98.46%
Faculty Result	98.46%

Prerequisite and Recap

- Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.
- Good knowledge of Python, LISP.
- Good foundation in calculus, linear algebra, statistics and discrete mathematics.

Objectives of Unit

- To understand basic concept and evolution of Artificial Intelligence
- To introduce the foundation of Artificial Intelligence
- To explore applications of Artificial Intelligence
- To understand application & structure of intelligent agents
- To understand the concept of Natural Language processing

Topic Objective

- **Topic**:

  Introduction to Artificial Intelligence

- **Topic Objective**:

  To know what is Artificial Intelligence, what are the Goals of AI, what Problems exist, and Advantages/Disadvantages of AI

Prerequisites & Recap

- **Prerequisites:**
  - Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.
  - Good knowledge of Python, LISP or PROLOG.
  - Good foundation in calculus, linear algebra, statistics and discrete mathematics.

- **Recap:**
  - Review of Mathematics concepts
  - Review of Python programming

1. Introduction (CO1)

- AI is the study of computer science that focuses on devising machines or developing software that exhibits human behavior.
- Examples of these tasks are visual perception, speech recognition, decision-making, and translation between languages.
- Purpose: to reduce human casualties in: Wars, Dangerous Workspaces, Car Accidents, Natural Disasters
- to just make everyday life easier by helping with tasks such as: Cleaning, Shopping, Transportation

1.1 Why Artificial Intelligence?

- With the help of AI, you can create such software or devices which can solve real-world problems very easily and with accuracy such as health issues, marketing, traffic issues, etc.
- With the help of AI, you can create your personal virtual Assistant, such as Cortana, Google Assistant, Siri, etc.
- With the help of AI, you can build such Robots which can work in an environment where survival of humans can be at risk.
- AI opens a path for other new technologies, new devices, and new Opportunities.

1.2 Advantages of Artificial Intelligence

- **High Accuracy with less errors:** AI machines or systems are prone to less errors and high accuracy as it takes decisions as per pre-experience or information.
- **High-Speed:** AI systems can be of very high-speed and fast-decision making, because of that AI systems can beat a chess champion in the Chess game.
- **High reliability:** AI machines are highly reliable and can perform the same action multiple times with high accuracy.
- **Useful for risky areas:** AI machines can be helpful in situations such as defusing a bomb, exploring the ocean floor, where to employ a human can be risky.

Advantages of Artificial Intelligence

- **Digital Assistant:** AI can be very useful to provide digital assistant to the users such as AI technology is currently used by various E-commerce websites to show the products as per customer requirement.
- **Useful as a public utility:** AI can be very useful for public utilities such as a self-driving car which can make our journey safer and hassle-free, facial recognition for security purpose, Natural language processing to communicate with the human in human-language, etc.

Disadvantages of Artificial Intelligence

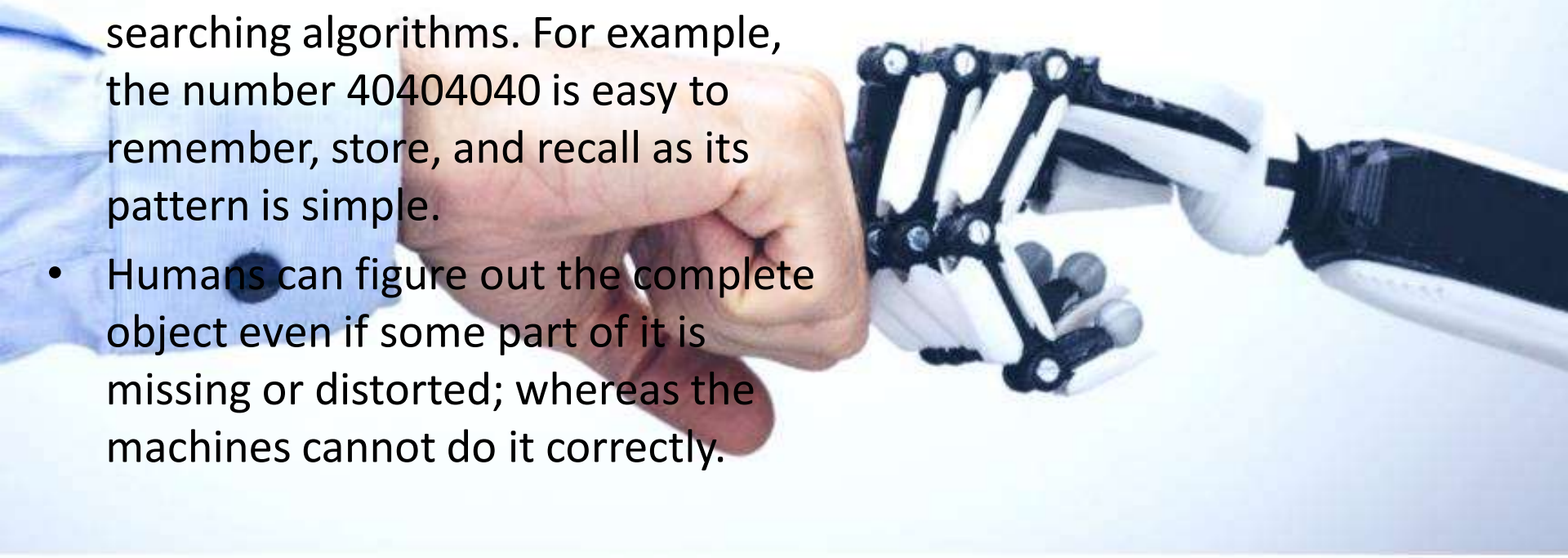
- **High Cost:** The hardware and software requirement of AI is very costly as it requires lots of maintenance to meet current world reqts.
- **Can't think out of the box:** Even we are making smarter machines with AI, but still they cannot work out of the box, as the robot will only do that work for which they are trained, or programmed.
- **No feelings and emotions:** AI machines can be an outstanding performer, but still it does not have the feeling so it cannot make any kind of emotional attachment with human, and may sometime be harmful for users if the proper care is not taken.
- **Increase dependency on machines:** With the increment of technology, people are getting more dependent on devices and hence they are losing their mental capabilities.
- **No Original Creativity:** As humans are so creative and can imagine some new ideas but still AI machines cannot beat this power of human intelligence and cannot be creative and imaginative.

1.3 Goals of AI

- Replicate human intelligence
- Solve Knowledge-intensive tasks
- An intelligent connection of perception and action
- Building a machine which can perform tasks that requires human intelligence such as:
  - Proving a theorem
  - Playing chess
  - Plan some surgical operation
  - Driving a car in traffic
- Creating some system which can exhibit intelligent behavior, learn new things by itself, demonstrate, explain, and can advise to its user.

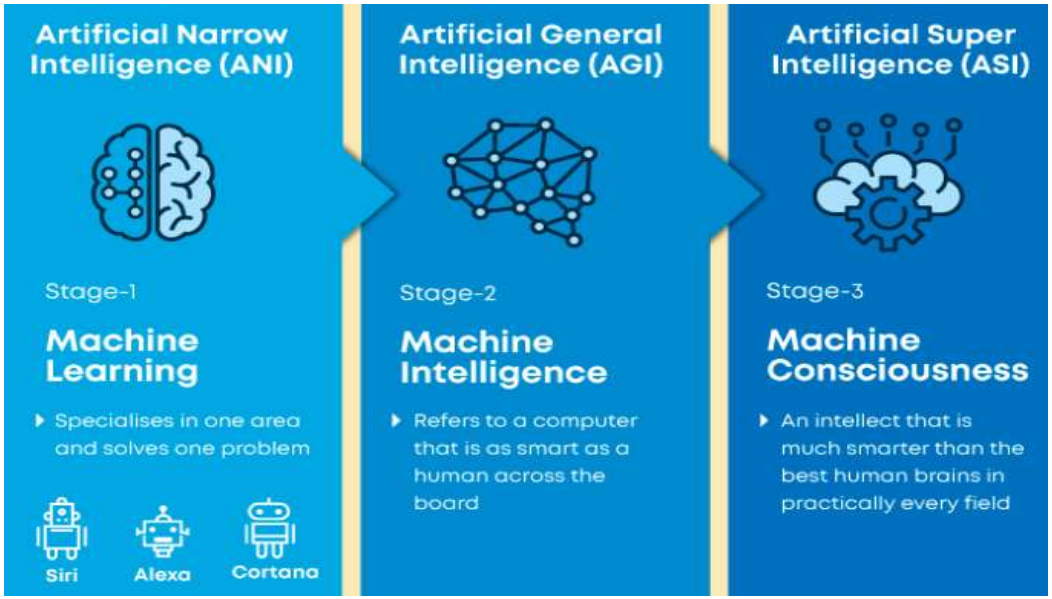
1.4 Difference between Human and Machine Intelligence

- Humans perceive by patterns whereas the machines perceive by set of rules and data.
- Humans store and recall information by patterns, machines do it by searching algorithms. For example, the number 40404040 is easy to remember, store, and recall as its pattern is simple.
- Humans can figure out the complete object even if some part of it is missing or distorted; whereas the machines cannot do it correctly.



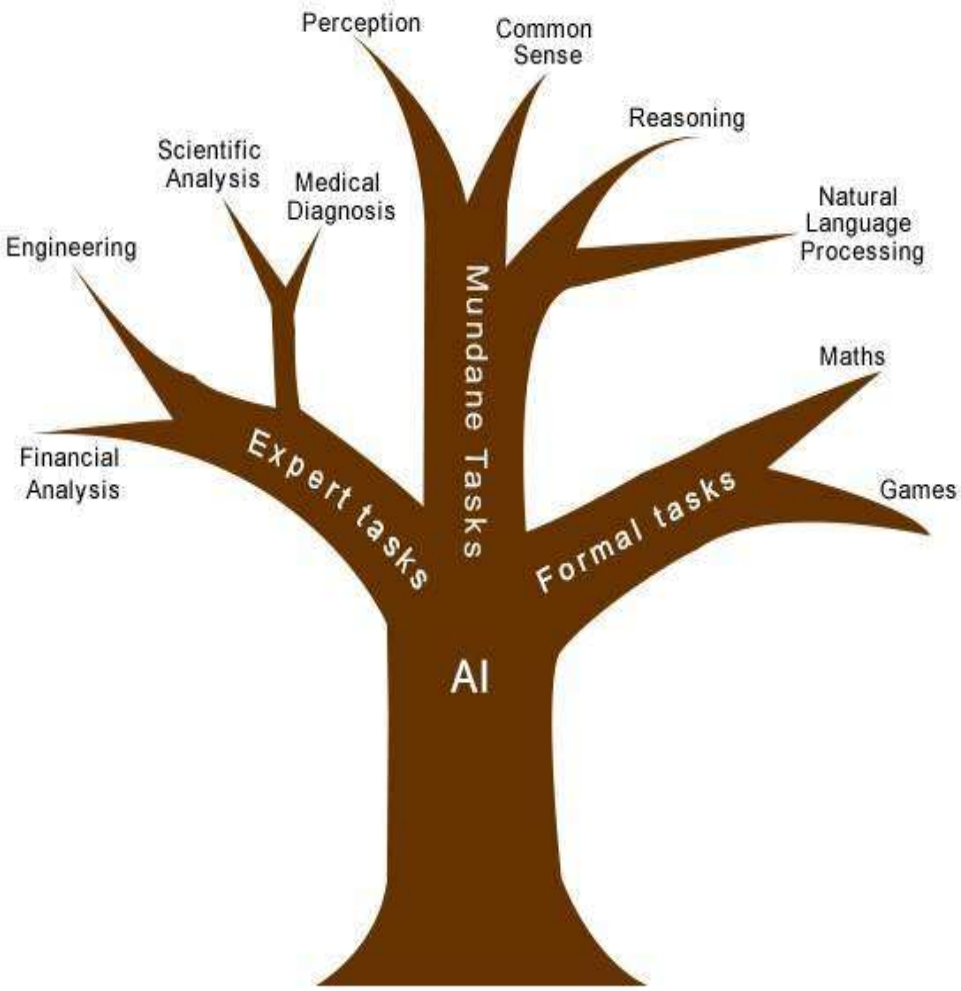
1.5 AI Levels

- **Narrow AI**: A artificial intelligence is said to be narrow when the machine can perform a specific task better than a human. The current research of AI is here now
- **General AI**: An artificial intelligence reaches the general state when it can perform any intellectual task with the same accuracy level as a human would
- **Strong AI**: An AI is strong when it can beat humans in many tasks



1.6 Task Domains of AI

- Mundane Tasks
  - Planning
  - Vision
  - Robotics
  - natural language processin
- Expert tasks
  - required specialized skills and training , for example Medical Diagnosis,Trouble Shooting Equipments.
- Formal Tasks
  - Games
  - Mathematics



Topic objective

- **Topic**:

  Foundation & History of AI

- **Topic Objective**:

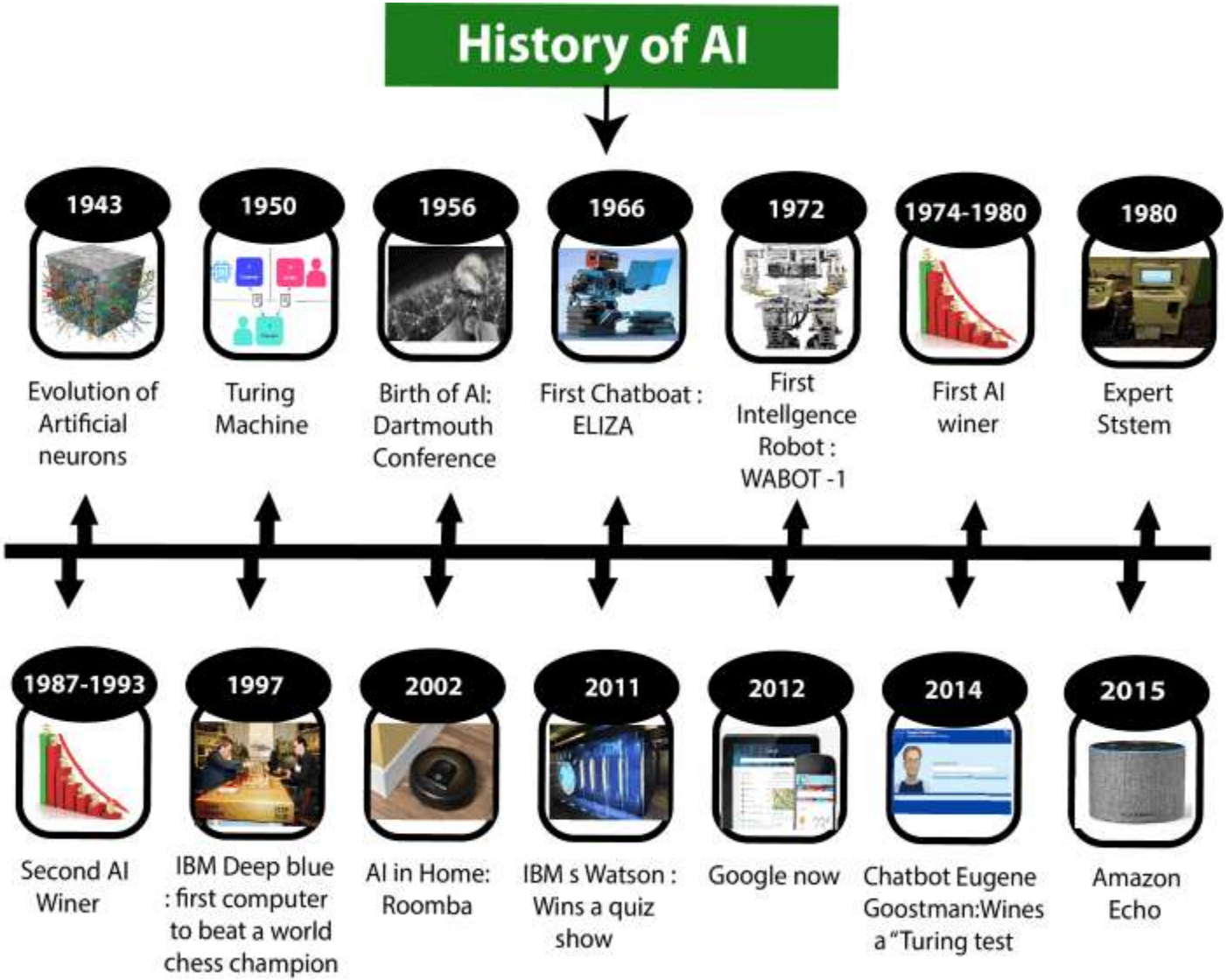
  To learn about the background of artificial intelligence, to know how it evolved throughout and what is currently in!

Prerequisites & Recap

- **Prerequisites:**
  - Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.

- **Recap:**
  - Studied the basics of Artificial Intelligence
  - Learned the goals, advantages/disadvantages, and levels of AI

History of AI



Maturation of Artificial Intelligence (1943-1952)

- **Year 1943:** The first work which is now recognized as AI was done by Warren McCulloch and Walter pits in 1943. They proposed a model of **artificial neurons**.
- **Year 1949:** Donald Hebb demonstrated an updating rule for modifying the connection strength between neurons. His rule is now called **Hebbian learning**.
- **Year 1950:** The Alan Turing who was an English mathematician and pioneered Machine learning in 1950. Alan Turing publishes **"Computing Machinery and Intelligence"** in which he proposed a test. The test can check the machine's ability to exhibit intelligent behavior equivalent to human intelligence, called a **Turing test**.

The birth of Artificial Intelligence (1952-1956)

- **Year 1955:** An Allen Newell and Herbert A. Simon created the "first artificial intelligence program"Which was named as **"Logic Theorist"**. This program had proved 38 of 52 Mathematics theorems, and find new and more elegant proofs for some theorems.
- **Year 1956:** The word "Artificial Intelligence" first adopted by American Computer scientist John McCarthy at the Dartmouth Conference. For the first time, AI coined as an academic field.

The golden years-Early enthusiasm(1956-1974)

- **Year 1966:** The researchers emphasized developing algorithms which can solve mathematical problems. Joseph Weizenbaum created the first chatbot in 1966, which was named as ELIZA.
- **Year 1972:** The first intelligent humanoid robot was built in Japan which was named as WABOT-1.

The first AI winter (1974-1980)

- The duration between years 1974 to 1980 was the first AI winter duration. AI winter refers to the time period where computer scientist dealt with a severe shortage of funding from government for AI researches.
- During AI winters, an interest of publicity on artificial intelligence was decreased.

A boom of AI (1980-1987)

- **Year 1980:** After AI winter duration, AI came back with "Expert System". Expert systems were programmed that emulate the decision-making ability of a human expert.
- In the Year 1980, the first national conference of the American Association of Artificial Intelligence **was held at Stanford University**.

The second AI winter (1987-1993)

- The duration between the years 1987 to 1993 was the second AI Winter duration.
- Again Investors and government stopped in funding for AI research as due to high cost but not efficient result. The expert system such as XCON was very cost effective.

The emergence of intelligent agents (1993-2011)

- **Year 1997:** In the year 1997, IBM Deep Blue beats world chess champion, Gary Kasparov, and became the first computer to beat a world chess champion.
- **Year 2002:** for the first time, AI entered the home in the form of Roomba, a vacuum cleaner.
- **Year 2006:** AI came in the Business world till the year 2006. Companies like Facebook, Twitter, and Netflix also started using AI.

Deep learning, big data and artificial general intelligence (2011-present)

- **Year 2011:** In the year 2011, IBM's Watson won jeopardy, a quiz show, where it had to solve the complex questions as well as riddles. Watson had proved that it could understand natural language and can solve tricky questions quickly.
- **Year 2012:** Google has launched an Android app feature "Google now", which was able to provide information to the user as a prediction.
- **Year 2014:** In the year 2014, Chatbot "Eugene Goostman" won a competition in the infamous "Turing test."
- **Year 2018:** The "Project Debater" from IBM debated on complex topics with two master debaters and also performed extremely well.

Topic Objective

- **Topic**:

  Applications of Artificial Intelligence

- **Topic Objective**:

  To learn about the areas where artificial intelligence has been proven to be useful and to develop an intellect to explore it further.

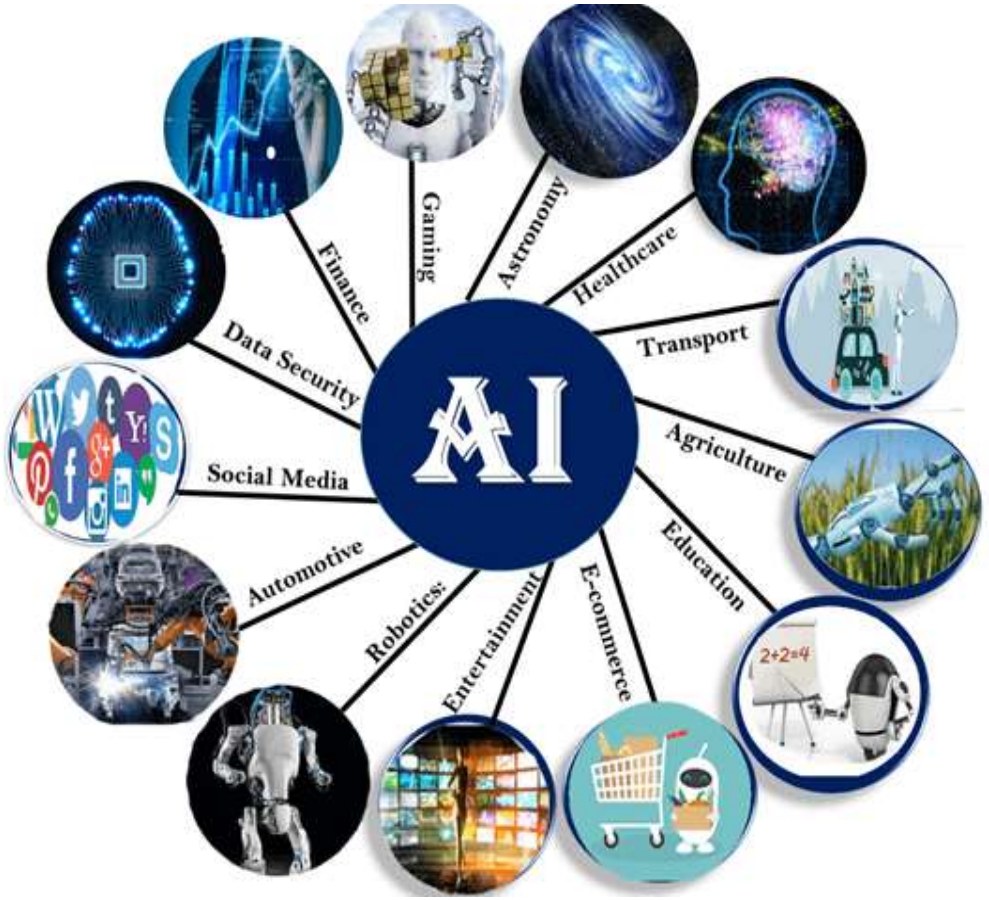
Prerequisites & Recap

- **Prerequisites:**
  - Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.

- **Recap:**
  - Studied the foundation & history of Artificial Intelligence and saw how it evolved throughout various stages.

3. Applications of AI (CO1)

- Game Playing
- Speech Recognition
- Computer Vision
- Expert Systems
- Virtual Reality
- Image Processing
- Artificial Creativity



Applications of AI

- **Gaming** – AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
- **Natural Language Processing** – It is possible to interact with the computer that understands natural language spoken by humans.
- **Expert Systems** – There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
- **Vision Systems** – These systems understand, interpret, and comprehend visual input on the computer. For example,
  - A spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas.
  - Doctors use clinical expert system to diagnose the patient.
  - Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.

Applications of AI

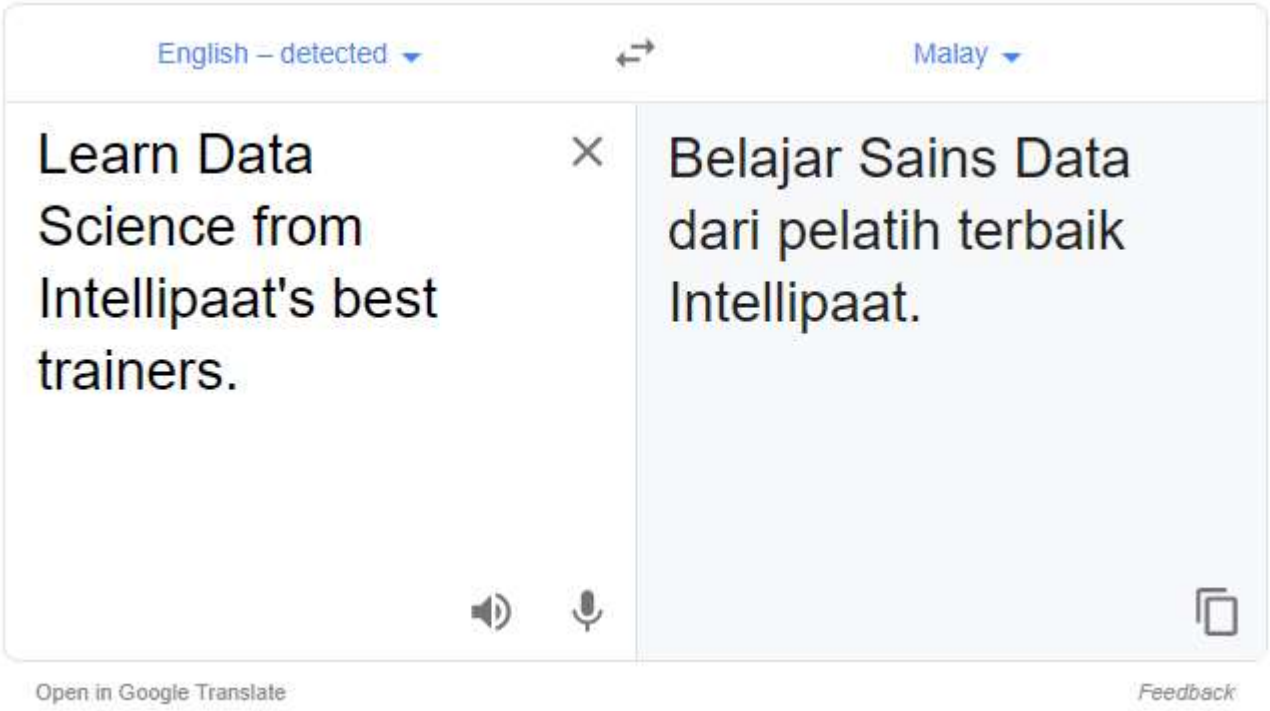
- **Speech Recognition** – Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.
- **Handwriting Recognition** – The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.
- **Intelligent Robots** – Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

Applications of AI

Amazon's Alexa

Alexa includes a speech recognition system that listens to our voice commands and gives answers. It recognizes our voice and then interprets it as a series of commands and returns the results to us. It uses AVS (Alexa Voice Service), which Amazon provides for free of cost.

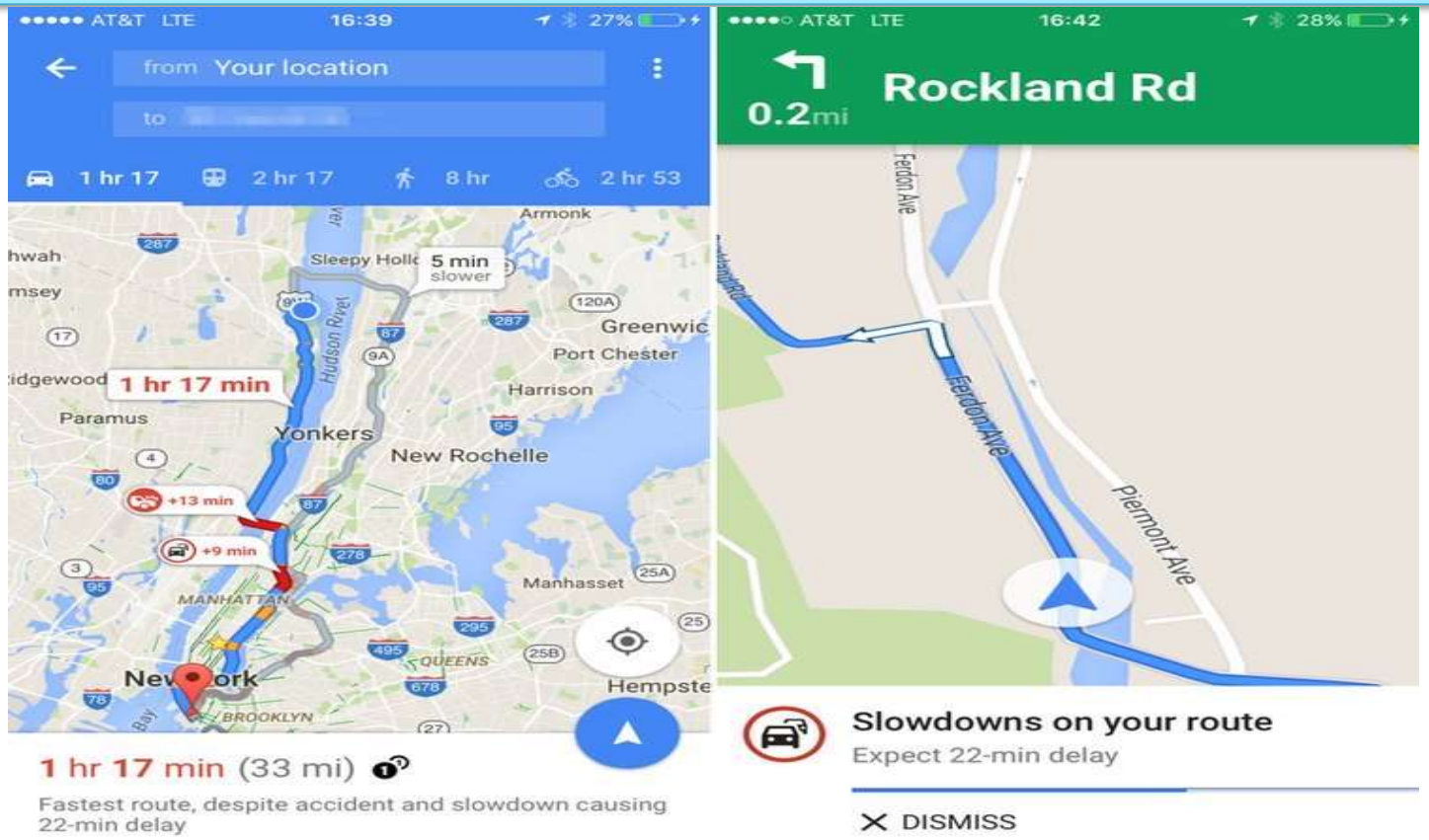
Applications of AI



Google Translate

Google Translate is another great application of Artificial Intelligence. It helps us translate sentences formed in one language to another. It can also translate the entire text on websites, which is possible only because of Artificial Intelligence.

Applications of AI



Google Maps

Today, without Google Maps, it is impossible to survive in the city. With Google Maps, we can travel from one place to another without any difficulty. All we have to do is open Google Maps and enter our location. Then, its navigation will lead us with the most optimized path to our destination. This is also one of the wonderful applications of artificial intelligence.

Topic Objective

- **Topic**:

  Intelligent Agents

- **Topic Objective**:

  To understand PEAS based grouping of Agents. PEAS stands for Performance, Environment, Actuators, and Sensors

Prerequisites & Recap

- **Prerequisites:**
  - Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.
  - Understanding of Python/LISP

- **Recap:**
  - Studied the application areas of artificial intelligence

4. Intelligent Agents (CO1)

- An **agent** is anything that can perceive its environment through **sensors** and acts upon that environment through **effectors.**
  - A **human agent** has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors, and other organs such as hands, legs, mouth, for effectors.
  - A **robotic agent** replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.
  - A **software agent** has encoded bit strings as its programs and actions.

4.1 PEAS based grouping of Agents

PEAS stands for Performance, Environment, Actuators, and Sensors. Based on these properties of an agent, they can be grouped together or can be differentiated from each other.

- **Performance:**
  The output which we get from the agent. All the necessary results that an agent gives after processing comes under its performance.
- **Environment:**
  All the surrounding things and conditions of an agent fall in this section. It basically consists of all the things under which the agents work.
- **Actuators:**
  The devices, hardware or software through which the agent performs any actions or processes any information to produce a result are the actuators of the agent.
- **Sensors:**
  The devices through which the agent observes and perceives its environment are the sensors of the agent.

PEAS based grouping of Agents- Example

EXAMPLE: Let us take an example of a self-driven car. As the name suggests, it is a car which drives on its own, by taking all the necessary decisions while driving without any help from the user (customer). In other words, we can say that this car drives on its own and requires no driver.

The **PEAS** description for this agent will be as follows:

- **Performance:** The performance factors for a self-driven car will be the Speed, Safety while driving (both of the car and the user), Time is taken to drive to a particular location, the comfort of the user, etc.
- **Environment:** The road on which the Car is being driven, other cars present on the road, crossings, road signs, traffic signals, etc. , all act as its environment.

PEAS based grouping of Agents- Example

- **Actuators:** All those devices through which the control of the car is handled, are the actuators of the car. For example, the Steering, Accelerator, Breaks, Horn, Music system, etc.

- **Sensors:** All those devices through which the car gets an estimate about its surroundings and it can draw certain perceptions out of it are its sensors. For example, Camera, Speedometer, GPS, Odometer, Sonar, etc.

Topic Objective

- **Topic**:

  Structure of Intelligent Agents

- **Topic Objective**:

  To learn about architecture and agent program and to study different Types of Agents and their working

Prerequisites & Recap

- **Prerequisites:**
  - Fundamental knowledge of the field of Information Technology, along with being familiar with computers, the Internet, and basic working knowledge on data.
  - Understanding of Python/LISP

- **Recap:**
  - Studied what is an agent program and the PEAS based grouping of Agents.

5. Structure of Intelligent Agents(CO1)

- Agent's structure can be viewed as −

  Agent = Architecture + Agent Program

- Architecture = the machinery that an agent executes on. It is a device with sensors and actuators, for example : a robotic car, a camera, a PC.

- Agent Program = an implementation of an agent function.
- An **agent function** is a map from the percept sequence(history of all that an agent has perceived till date) to an action.

Structure of Intelligent Agents

- A simple agent program can be defined mathematically as a function f (called the "agent function")which maps every possible percepts sequence to a possible action the agent can perform or to a coefficient, feedback element, function or constant that affects eventual actions:

$$f:P^* \rightarrow A$$

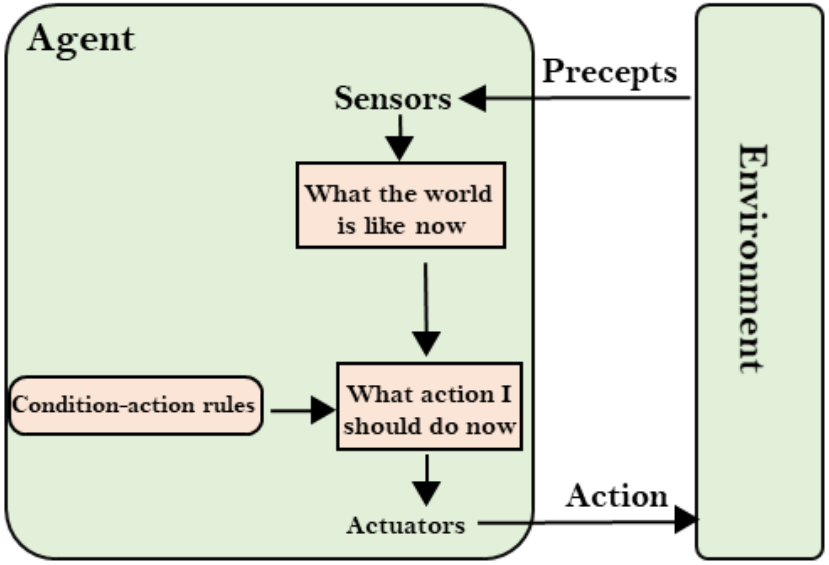
- Agent function is an abstract concept as it could incorporate various principles of decision making like calculation of utility of individual options, deduction over logic rules, fuzzy logic, etc.
- The program agent, instead, maps every possible percept to an action.
- We use the term percept to refer to the agent's perceptional inputs at any given instant.

5.1 Types of Intelligent Agents

- Types of AI Agents
  - Simple Reflex Agent
  - Model-based reflex agent
  - Goal-based agents
  - Utility-based agent
  - Learning agent

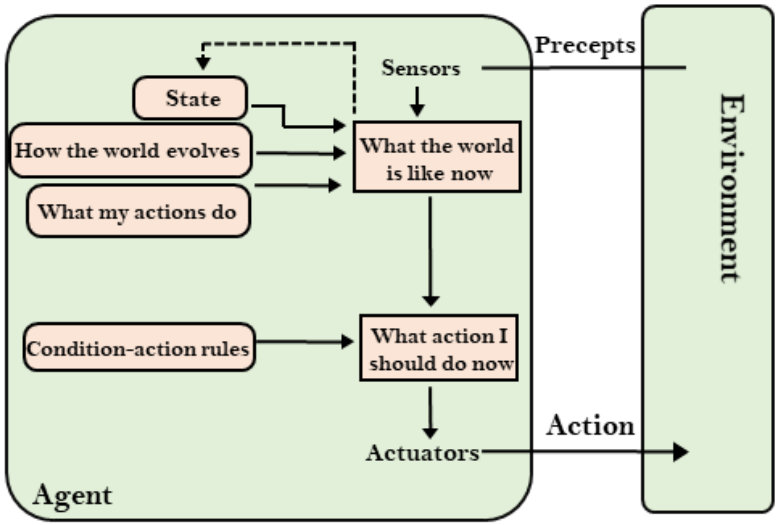
Types of Agents

- **Simple Reflex agent:**
  - These agents take decisions on the basis of the current percepts and ignore the rest of the percept history.
  - These agents only succeed in the fully observable environment.
  - The Simple reflex agent works on Condition-action rule, which means it maps the current state to action. Such as a Room Cleaner agent, it works only if there is dirt in the room.



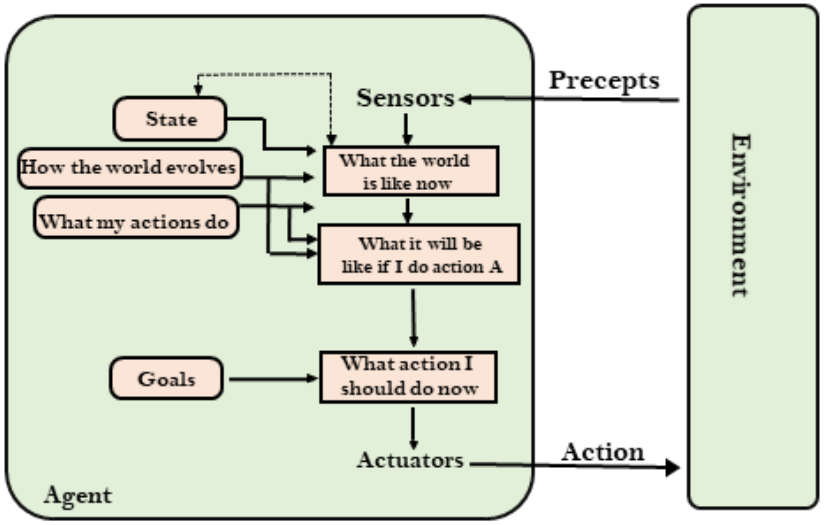
Types of Agents

- **Model-based reflex agent:**
  - The Model-based agent can work in a partially observable environment, and track the situation.
  - These agents have the model, "which is knowledge of the world" and based on the model they perform actions.
  - Updating the agent state requires information about: How the world evolves & How the agent's action affects the world.



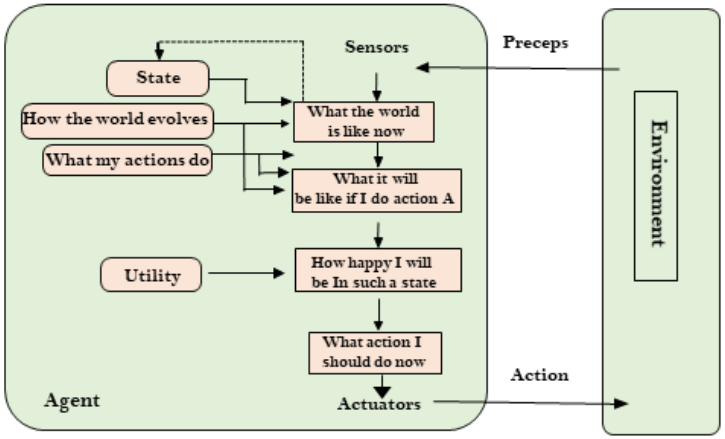
Types of Agents

- **Goal-based agents:**
  - The knowledge of the current state environment is not always sufficient to decide for an agent to what to do.
  - Goal-based agents expand the capabilities of the model-based agent by having the "goal" information.
  - They choose an action, so that they can achieve the goal.
  - These agents may have to consider a long sequence of possible actions before deciding whether the goal is achieved or not.



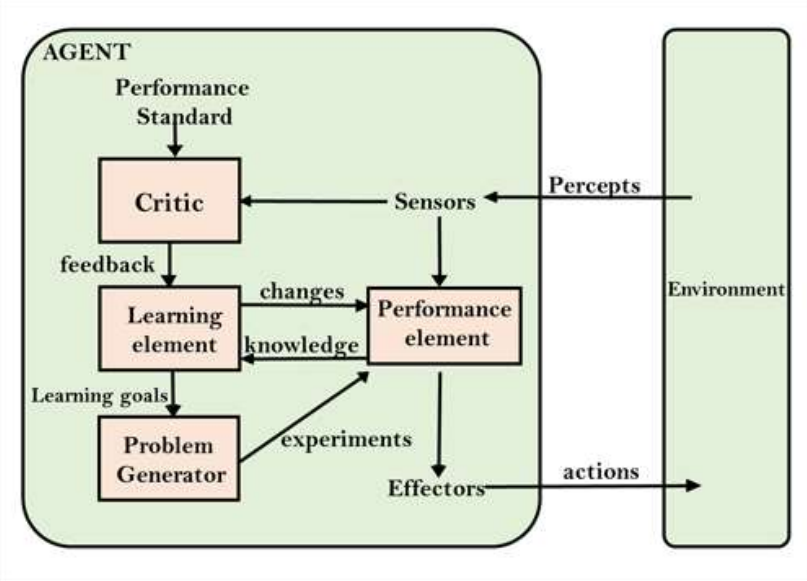
Types of Agents

- **Utility-based agents:**
  - These agents are similar to the goal-based agent but provide an extra component of utility measurement which makes them different by providing a measure of success at a given state.
  - The Utility-based agent is useful when there are multiple possible alternatives, and an agent has to choose in order to perform the best action.
  - The utility function maps each state to a real number to check how efficiently each action achieves the goals.



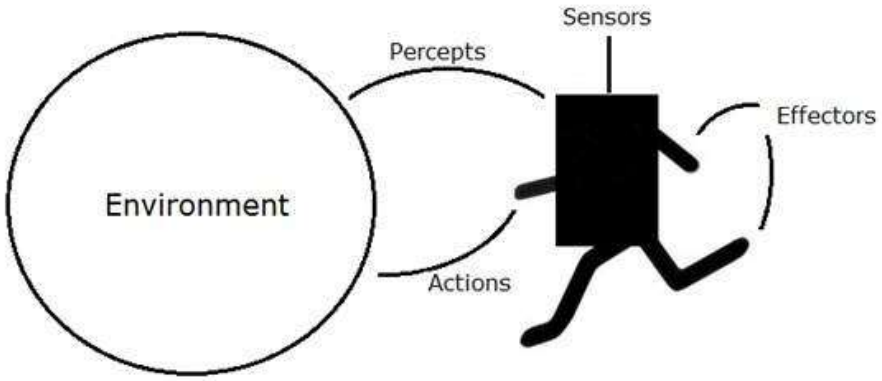
Types of Agents

- **Learning Agents:**
  - A learning agent in AI is the type of agent which can learn from its past experiences, or it has learning capabilities.
  - It starts to act with basic knowledge and then able to act and adapt automatically through learning.
  - A learning agent has mainly four conceptual components, which are: **Learning element, Critic, Performance element, Problem generator**.



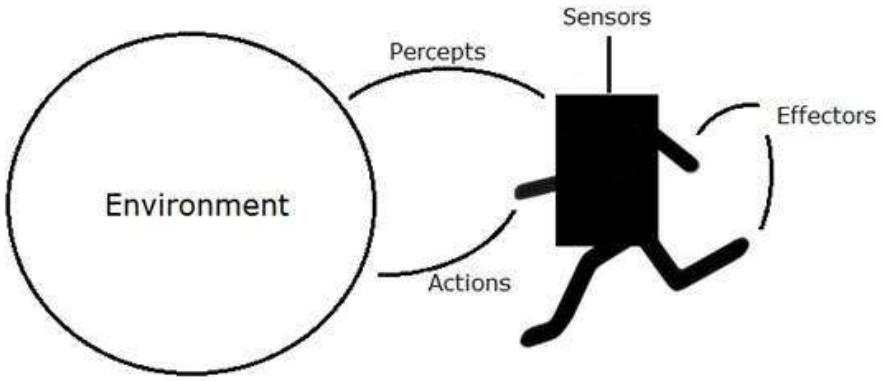
Intelligent agents

- **Performance Measure of Agent** – It is the criteria, which determines how successful an agent is.
- **Behavior of Agent** – It is the action that agent performs after any given sequence of percepts.



Intelligent agents

- **Percept** – It is agent's perceptual inputs at a given instance.
- **Percept Sequence** – It is the history of all that an agent has perceived till date.
- **Agent Function** – It is a map from the precept sequence to an action.



Faculty Video Links, Youtube & NPTEL Video Links and Online Courses Details

- Youtube/other Video Links:

https://www.youtube.com/watch?v=pAMGj0AT5Wk

https://www.youtube.com/watch?v=XCPZBD9lbVo

https://nptel.ac.in/courses/106105077/

Daily Quiz

- Who is the “father” of artificial intelligence?
  a) Fisher Ada
  b) John McCarthy
  c) Allen Newell
  d) Alan Turning

- In 1985, the famous chess player David Levy beat a world champion chess program in four straight games by using orthodox moves that confused the program. What was the name of the chess program?
  a) Kaissa
  b) CRAY BLITZ
  c) Golf
  d) DIGDUG

Daily Quiz

- The conference that launched the AI revolution in 1956 was held at?
  a) Dartmouth
  b) Harvard
  c) New York
  d) Stanford

- The AI researcher who co-authored both the Handbook of Artificial Intelligence and The Fifth Generation is _____
  a) Bruce Lee
  b) Randy Davis
  c) Ed Feigenbaum
  d) Mark Fox

Daily Quiz

- The Face Recognition system is based on?
  a) Strong Artificial Intelligence approach
  b) Weak Artificial Intelligence approach
  c) Cognitive Artificial Intelligence approach
  d) Applied Artificial Intelligence approach

- A completely automated chess engine (Learn from previous games) is based on?
  a) Strong Artificial Intelligence approach
  b) Weak Artificial Intelligence approach
  c) Cognitive Artificial Intelligence approach
  d) Applied Artificial Intelligence approach

Daily Quiz

- How many types of agents are there in artificial intelligence?
  a) 1
  b) 2
  c) 3
  d) 4

- What are the composition for agents in artificial intelligence?
  a) Program
  b) Architecture
  c) Both Program & Architecture
  d) None of the mentioned

Daily Quiz

- In which agent does the problem generator is present?
  a) Learning agent
  b) Observing agent
  c) Reflex agent
  d) None of the mentioned

- Which is used to improve the agents performance?
  a) Perceiving
  b) Learning
  c) Observing
  d) None of the mentioned

Daily Quiz

- Which element in the agent are used for selecting external actions?
  a) Perceive
  b) Performance
  c) Learning
  d) Actuator

- NLP is concerned with the interactions between computers and human (natural) languages.
  a) True
  b) False

Daily Quiz

- What is Coreference Resolution?
  a) Anaphora Resolution
  b) Given a sentence or larger chunk of text, determine which words ("mentions") refer to the same objects ("entities")
  c) All of the mentioned
  d) None of the mentioned
- Modern NLP algorithms are based on machine learning, especially statistical machine learning.
  a) True
  b) False
- What is Morphological Segmentation?
  a) Does Discourse Analysis
  b) Separate words into individual morphemes and identify the class of the morphemes
  c) Is an extension of propositional logic
  d) None of the mentioned

Weekly Assignment

- What are the various areas where AI (Artificial Intelligence) can be used?
- What Are Intelligent Agents, and How Are They Used in AI?
- What are the Problem Characteristics of Artificial Intelligence?
- Design the PEAS measure for satellite agent
- Describe the role of computer vision in artificial intelligence. Write the history of AI
- What are the factors that a rational agent should depend on at any given time?
- State the various properties of an environment
- What are the goals of AI?

MCQ s

- What is Artificial intelligence?
  a) Putting your intelligence into Computer
  b) Programming with your own intelligence
  c) Making a Machine intelligent
  d) Playing a Game

- Strong Artificial Intelligence is _____
  a) the embodiment of human intellectual capabilities within a computer
  b) a set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans
  c) the study of mental faculties through the use of mental models implemented on a computer
  d) all of the mentioned

MCQ s

- Visual clues that are helpful in computer vision include _____
  a) color and motion
  b) depth and texture
  c) height and weight
  d) color and motion, depth and texture

- The performance of an agent can be improved by _____
  a) Learning
  b) Observing
  c) Perceiving
  d) None of the mentioned

MCQ s

- External actions of the agent is selected by _____
  a) Perceive
  b) Performance
  c) Learning
  d) Actuator

- A computer vision technique that relies on image templates is _____
  a) edge detection
  b) binocular vision
  c) model-based vision
  d) robot vision

MCQ s

- The action of the Simple reflex agent completely depends upon _____
  a) Perception history
  b) Current perception
  c) Learning theory
  d) Utility functions

- A basic line following robot is based on _____
  a) Strong Artificial Intelligence approach
  b) Weak Artificial Intelligence approach
  c) Cognitive Artificial Intelligence approach
  d) Applied Artificial Intelligence approach

MCQ s

- Which of the following task/tasks Artificial Intelligence could not do yet?
  a) Understand natural language robustly
  b) Web mining
  c) Construction of plans in real time dynamic systems
  d) All of the mentioned

- Which instruments are used for perceiving and acting upon the environment?
  a) Sensors and Actuators
  b) Sensors
  c) Perceiver
  d) None of the mentioned

MCQ s

- What is meant by agent's percept sequence?
  a) Used to perceive the environment
  b) Complete history of actuator
  c) Complete history of perceived things
  d) None of the mentioned
- What is the rule of simple reflex agent?
  a) Simple-action rule
  b) Condition-action rule
  c) Simple & Condition-action rule
  d) None of the mentioned
- Which agent deals with happy and unhappy states?
  a) Simple reflex agent
  b) Model based agent
  c) Learning agent
  d) Utility based agent

MCQ s

- Which kind of agent architecture should an agent an use?
  a) Relaxed
  b) Logic
  c) Relational
  d) All of the mentioned

- What is the main challenge/s of NLP?
  a) Handling Ambiguity of Sentences
  b) Handling Tokenization
  c) Handling POS-Tagging
  d) All of the mentioned

MCQ s

- Choose form the following areas where NLP can be useful.
  a) Automatic Text Summarization
  b) Automatic Question-Answering Systems
  c) Information Retrieval
  d) All of the mentioned

- Which of the following includes major tasks of NLP?
  a) Automatic Summarization
  b) Discourse Analysis
  c) Machine Translation
  d) All of the mentioned

MCQ s

- What is the field of Natural Language Processing (NLP)?
  a) Computer Science
  b) Artificial Intelligence
  c) Linguistics
  d) All of the mentioned
- Modern NLP algorithms are based on machine learning, especially statistical machine learning.
  a) True
  b) False
- What is Machine Translation?
  a) Converts one human language to another
  b) Converts human language to machine language
  c) Converts any human language to English
  d) Converts Machine language to human language

Glossary Questions

- [Converts one human language to another , Handling Ambiguity of Sentences ,Computer Science, Sensors and Actuators, Current perception]

- Field of Natural Language Processing (NLP).
- Machine Translation is _____.
- Main challenge/s of NLP_____.
- The action of the Simple reflex agent completely depends upon_____.
- Which instruments are used for perceiving and acting upon the environment?

Old Question Paper

Printed Page 1 of 2 | Sub Code: RCS702

Paper Id: 110730 | Roll No: | | | | | | | | | | | | |

B.TECH.
(SEM VII) THEORY EXAMINATION 2019-20
ARTIFICIAL INTELLIGENCE

Time: 3 Hours | ***Total Marks: 70***

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.** **2 x 7 = 14**

(a) Write the history of artificial intelligence.
(b) Describe optimal problem with suitable example.
(c) Define utility theory.
(d) What are statistical learning models?
(e) Define Bayes classifier.
(f) Justify the use of searching in game.
(g) Write the difference between the prepositional and predicate logic.

Old Question Paper

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) Define Principle component analysis (PCA). Determine the 2 PCA of the following set of observations of 2-dimensional data having 5 examples

S. No.	X	Y
1	-1.4	-1.9
2	-0.5	-0.8
3	0.1	0.1
4	0.8	1.1
5	1.4	1.8

(b) Explain about the Hill climbing algorithm with its drawback and how it can be overcome?

(c) Describe the rules of inference in first order predicate logic with suitable example.

(d) Define Reinforcement learning. Differentiate between the passive and active reinforcement learning. Is for evolution reinforcement learning an appropriate abstract model for human learning?

(e) Explain the role of artificial intelligence in natural language processing.

Old Question Papers

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define intelligent agent. Explain various types agent programs with suitable example.

(b) Explain computer vision in parlance to the artificial intelligence,

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is heuristic function? Differentiate between blind search and heuristic search strategies.

(b) What is adversarial search? Write the steps for game problem formulation. State and explain minimax algorithm with tic-tac-toe game.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Differentiate between forward and backward chaining of inference with the help of example.

Old Question Papers

Printed Page 2 of 2 | Sub Code: RCS702

Paper Id: 110730 | Roll No:

(b) Translate the following sentences in formulas in predicate logic and casual form:

i. John likes all kind of food.
ii. Apples are food.
iii. Chicken is food.
iv. Anything anyone eats and is not killed by is food.
v. Bill eats peanuts and is still alive.
vi. Sue eats everything Bill eats.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define machine learning. Explain supervised and unsupervised learning with suitable example.

(b) Explain the following in detail

i) Naïve Bayes model
ii) Learning with hidden data- EM algorithm

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) How Linear Discriminant Analysis is different from logistics regression? Explain Linear Discriminant Analysis (LDA) with suitable example.

(b) What is clustering? Describe k-mean clustering technique.

Note: The Subject with this code was introduced last year only; so only one previous year paper available

Expected Questions for University Exam

- Give the structure of an agent in an environment
- How to measure the performance of an agent?
- What are the factors that a rational agent should depend on at any given time?
- How is computer vision related to AI?
- Give applications of NLP
- Write the history of Artificial Intelligence
- Define learning agent with the help of architecture.
- What is PEAS? Explain with example
- What is the role of NLP in AI? Define various phases of NLP
- List various criterions for success in AI

Summary

- Google has demonstrated an AI program "Duplex" which was a virtual assistant and which had taken hairdresser appointment on call, and lady on other side didn't notice that she was talking with the machine.
- The concept of Deep learning, big data, and data science are now trending like a boom. Nowadays companies like Google, Facebook, IBM, and Amazon are working with AI and creating amazing devices.

References

- Text books:
  - Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
  - Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India,
- Web:
  - https://www.tutorialspoint.com/artificial_intelligence/index.htm
  - https://www.javatpoint.com/artificial-intelligence-tutorial
  - https://becominghuman.ai/a-simple-introduction-to-natural-language-processing-ea66a1747b32
  - https://intellipaat.com/blog/tutorial/artificial-intelligence-tutorial/
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Thank You