

SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

AI Techniques in Electrical Engineering

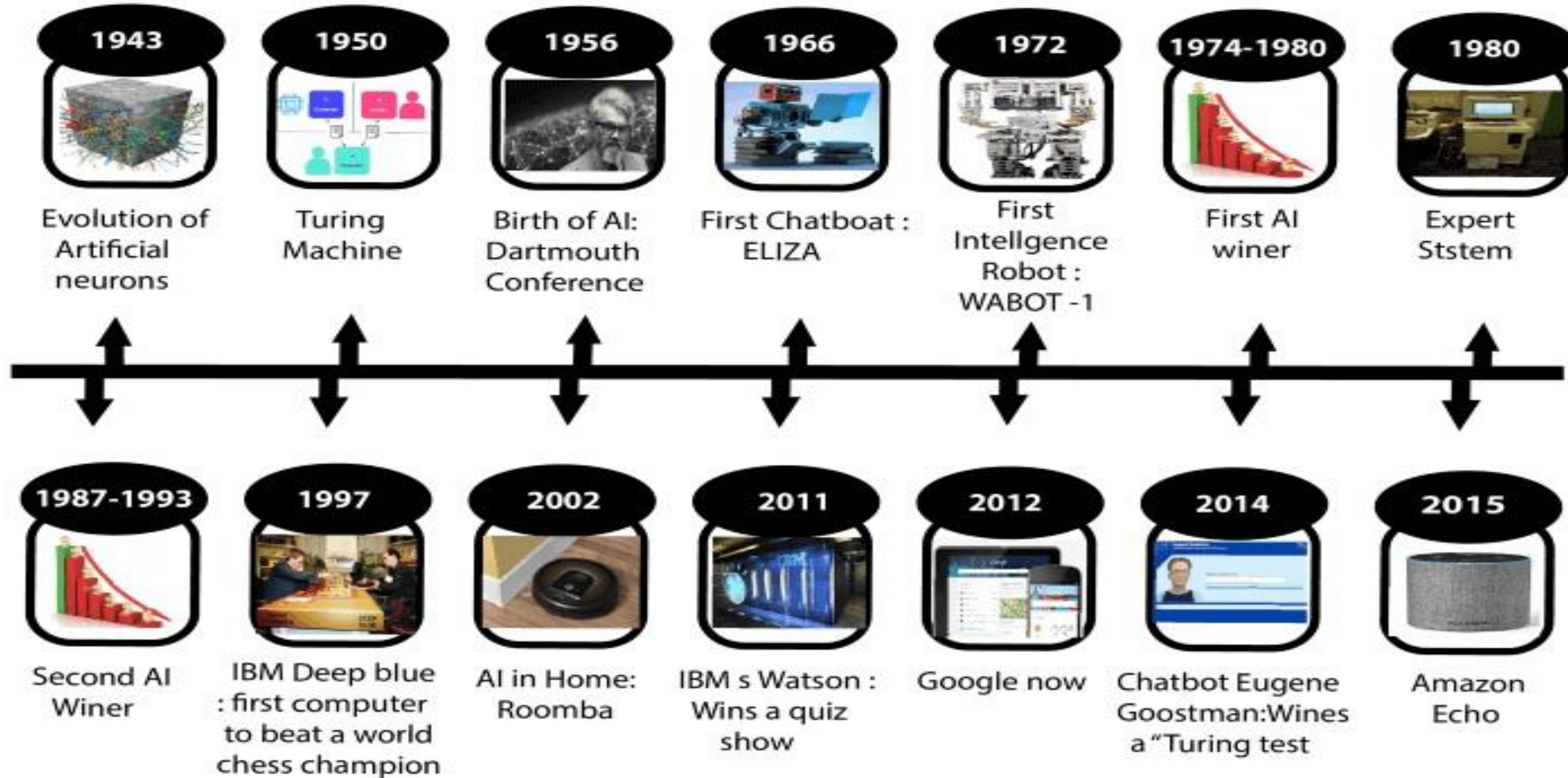
UNIT – 1
AI FUNDAMENTALS



Artificial Intelligence



History of Artificial Intelligence





Maturation of Artificial Intelligence (1943-1952)



Year 1943: The first work which is now recognized as AI was done by Warren McCulloch and Walter Pitts 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: 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 2018: The "Project Debater" from IBM debated on complex topics with two master debaters and also performed extremely well.



Artificial Intelligence Now



Now AI has developed to a remarkable level.

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.

The future of Artificial Intelligence is inspiring and will come with high intelligence.



ASSESSMENT



1. Artificial Intelligence is about_____.
 - a) Playing a game on Computer
 - b) Making a machine Intelligent
 - c) Programming on Machine with your Own Intelligence
 - d) Putting your intelligence in Machine





ASSESSMENT



2. Who is known as the -Father of AI"?

- Fisher Ada
- Alan Turing
- John McCarthy
- Allen Newell





ASSESSMENT

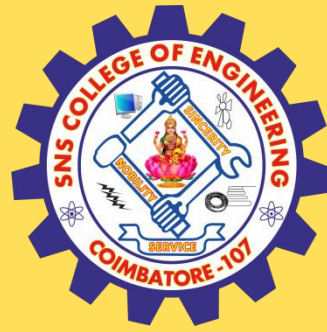


3. The application/applications of Artificial Intelligence is/are

- Expert Systems
- Gaming
- Vision Systems
- All of the above







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Artificial intelligence



Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing and speech and machine vision.



Artificial intelligence- Importance



- AI is important for its potential to change how we live, work and play.
- It has been effectively used in business to automate tasks done by humans, including customer service work, lead generation, fraud detection and quality control.
- In a number of areas, AI can perform tasks much better than humans.
- Particularly when it comes to repetitive, detail-oriented tasks, such as analyzing large numbers of legal documents to ensure relevant fields are filled in properly, AI tools often complete jobs quickly with few.



Advantages - Artificial intelligence



Good at detail-oriented jobs. AI has proven to be as good or better than doctors at diagnosing certain cancers, including breast cancer.

Reduced time for data-heavy tasks. AI is widely used in data-heavy industries, including banking and securities, pharma and insurance, to reduce the time it takes to analyze big data sets.

Saves labor and increases productivity. An example here is the use of warehouse automation , which grew during the pandemic and is expected to increase with the integration of AI and machine learning.



Advantages - Artificial intelligence



Delivers consistent results. The best AI translation tools deliver high levels of consistency, offering even small businesses the ability to reach customers in their native language.

Can improve customer satisfaction through personalization. AI can personalize content, messaging, ads, recommendations and websites to individual customers.

AI-powered virtual agents are always available. AI programs do not need to sleep or take breaks, providing 24/7 service.



Disadvantages - Artificial intelligence



- Expensive.
- Requires deep technical expertise.
- Limited supply of qualified workers to build AI tools.
- Reflects the biases of its training data, at scale.
- Lack of ability to generalize from one task to another.
- Eliminates human jobs, increasing unemployment rates.

Types of Artificial intelligence

There are four types of **Artificial Intelligence**





Reactive machines Artificial intelligence



- This category of AI comprises devices that only use the data that is now available and take into consideration the current circumstances.
- Reactive AI systems are unable to conclude from the information to choose the best course of action.
- They are only capable of a limited set of predetermined duties.

Eg.
chess-playing supercomputer
spam detection



Limited Memory Artificial intelligence



- Artificial intelligence is one form that has limited memory. It speaks to an AI's capacity to retain past information and forecasts and use it to inform future predictions.
- The complexity of machine learning design increases slightly when memory is constrained.
- Every ML model needs a little amount of memory to build, but the model may be used as a reactive machine type, as this is the most fundamental and straightforward kind of AI.

Eg.

- Self-driving automobiles



Theories of Mind Artificial intelligence



- Theories of Mind Artificial intelligence (AI) is a highly developed form of AI.
- It is thought that this class of devices is crucial to psychology.
- To better understand human beliefs and ideas, this sort of AI will primarily rely on emotional maturity.



Self aware Artificial intelligence



- The evolution of AI has reached its conclusion, yet it only exists in theory for now.
- Self-aware AI, as the name suggests, is an AI that has evolved to be so like the human brain that it has developed self-awareness.

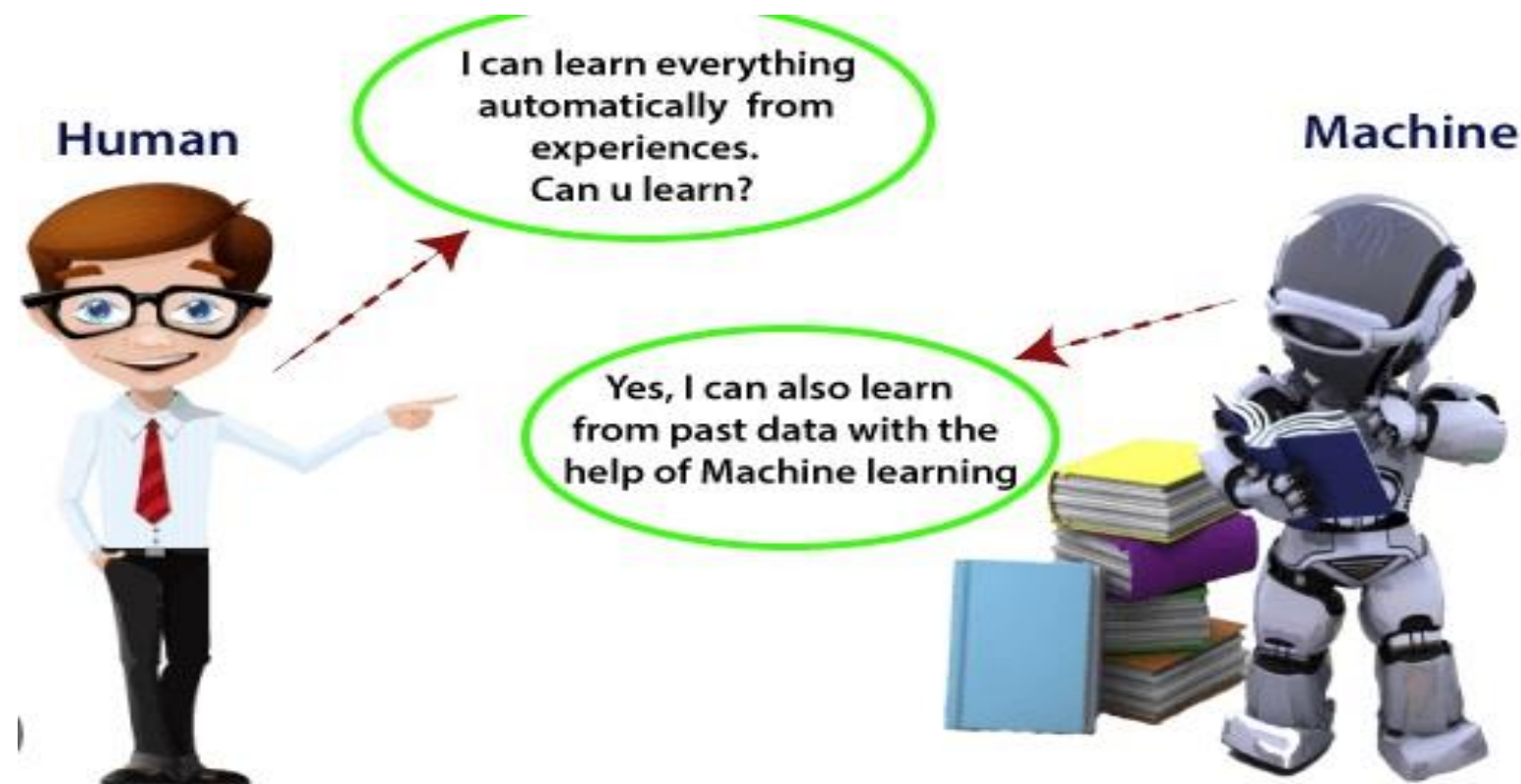


Techniques of Artificial intelligence

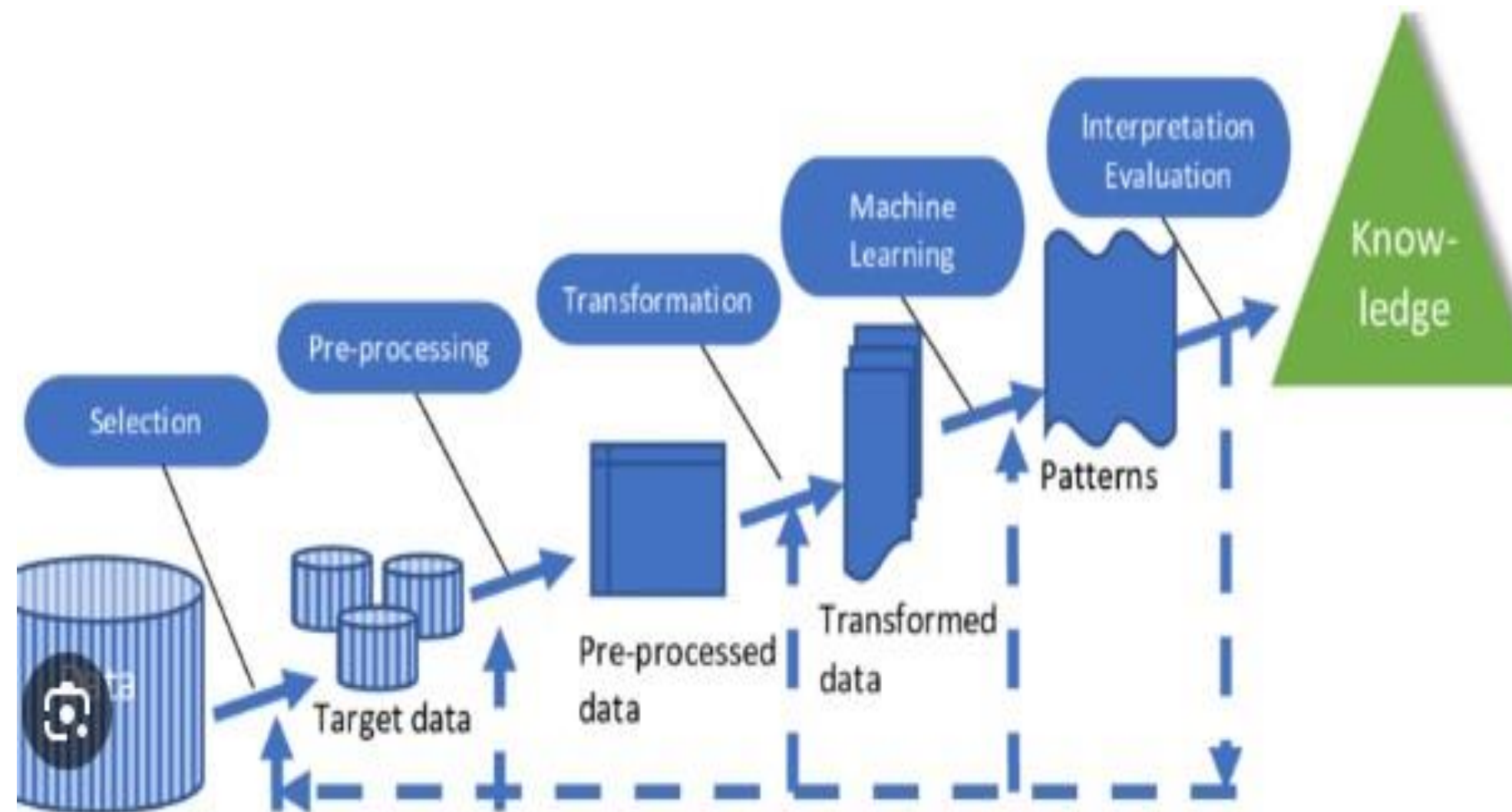


Machine Learning

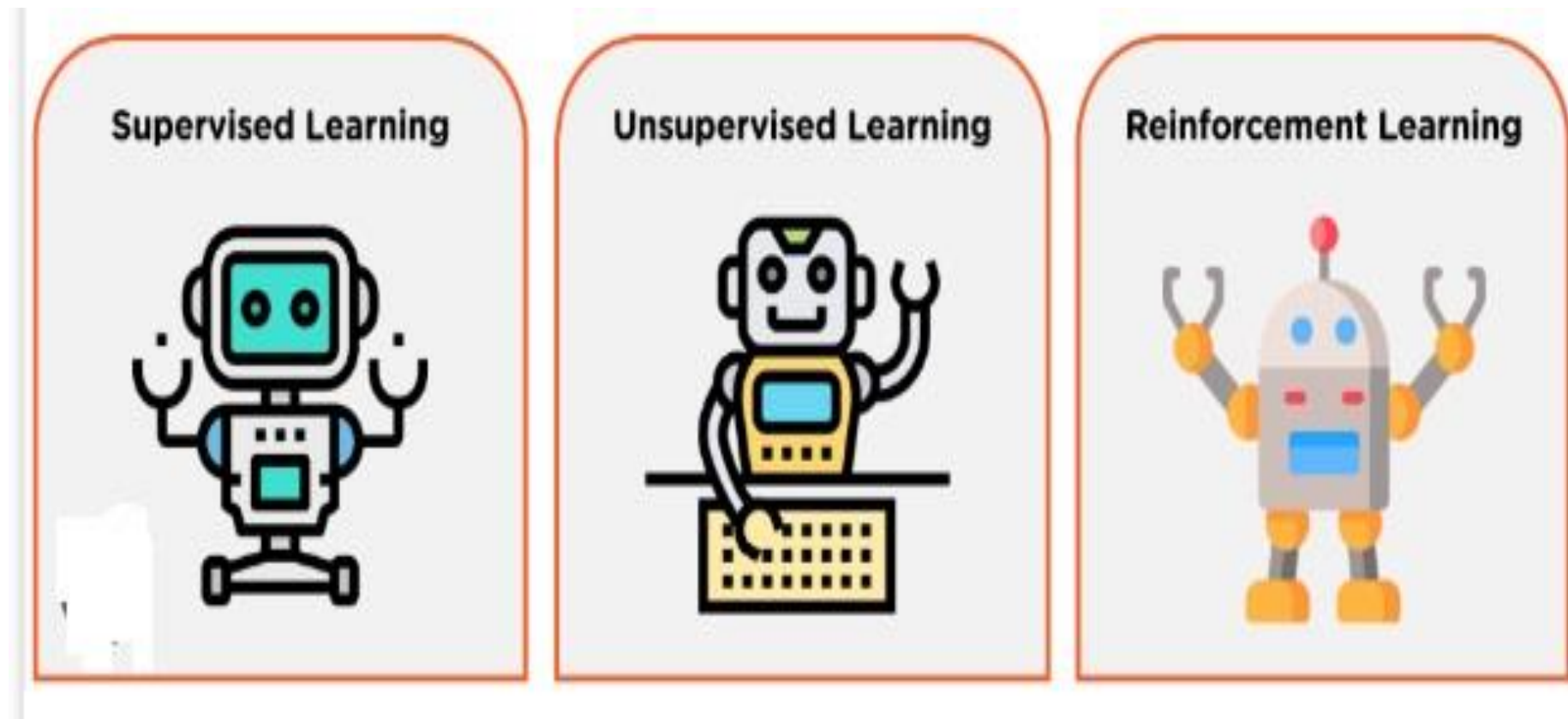
- Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.



Process of Machine Learning



Types of Machine Learning

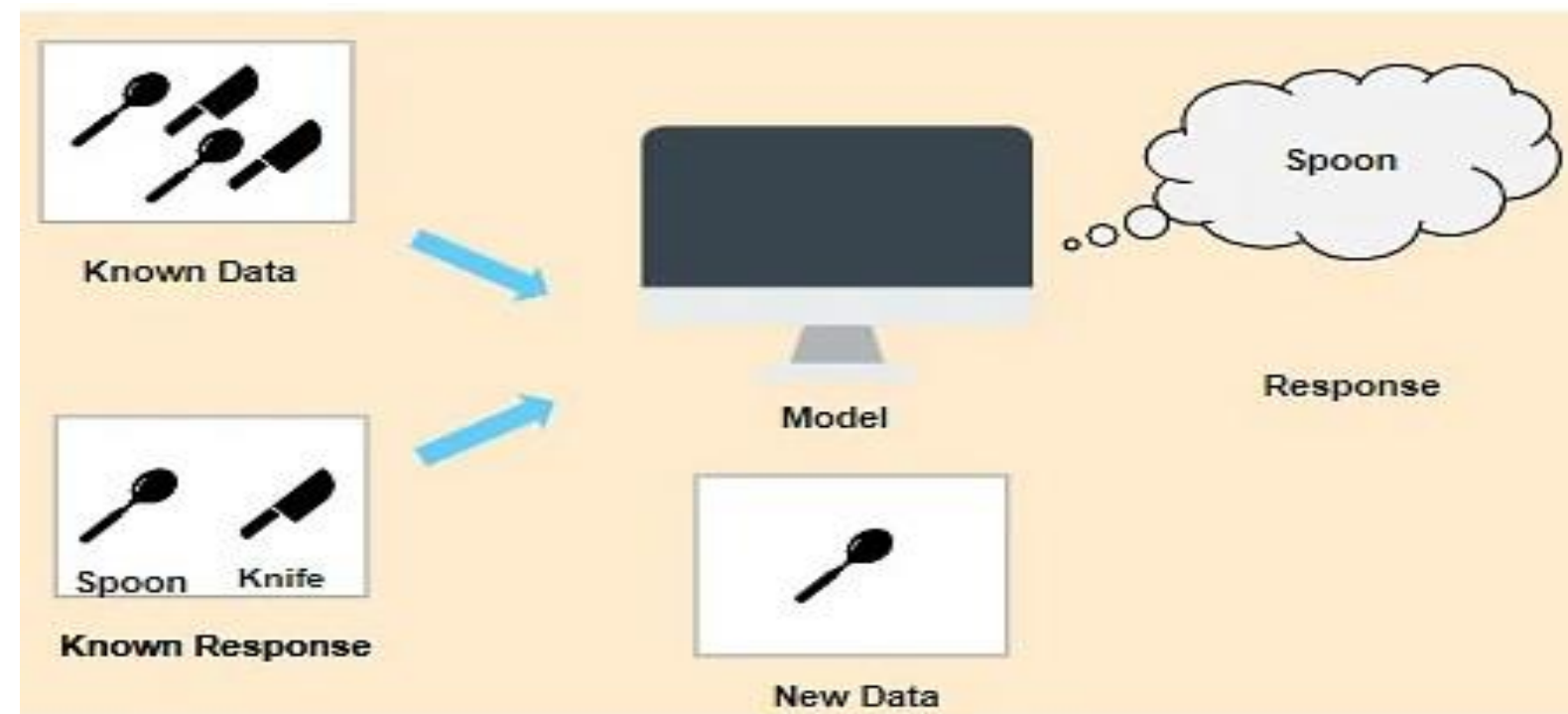


Supervised Learning

In Supervised Learning, the machine learns under supervision.

It contains a model that is able to predict with the help of a labeled dataset.

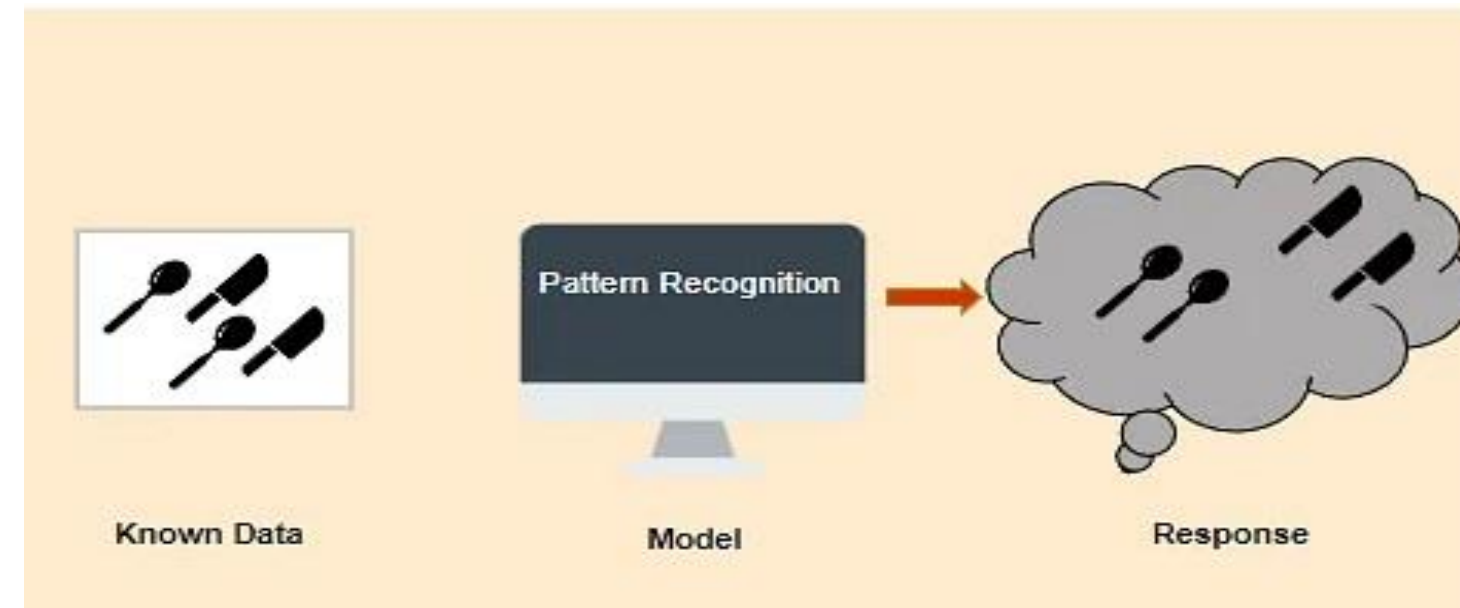
A labeled dataset is one where you already know the target answer.





Unsupervised Learning

- In Unsupervised Learning, the machine uses unlabeled data and learns on itself without any supervision.
- The machine tries to find a pattern in the unlabeled data and gives a response.



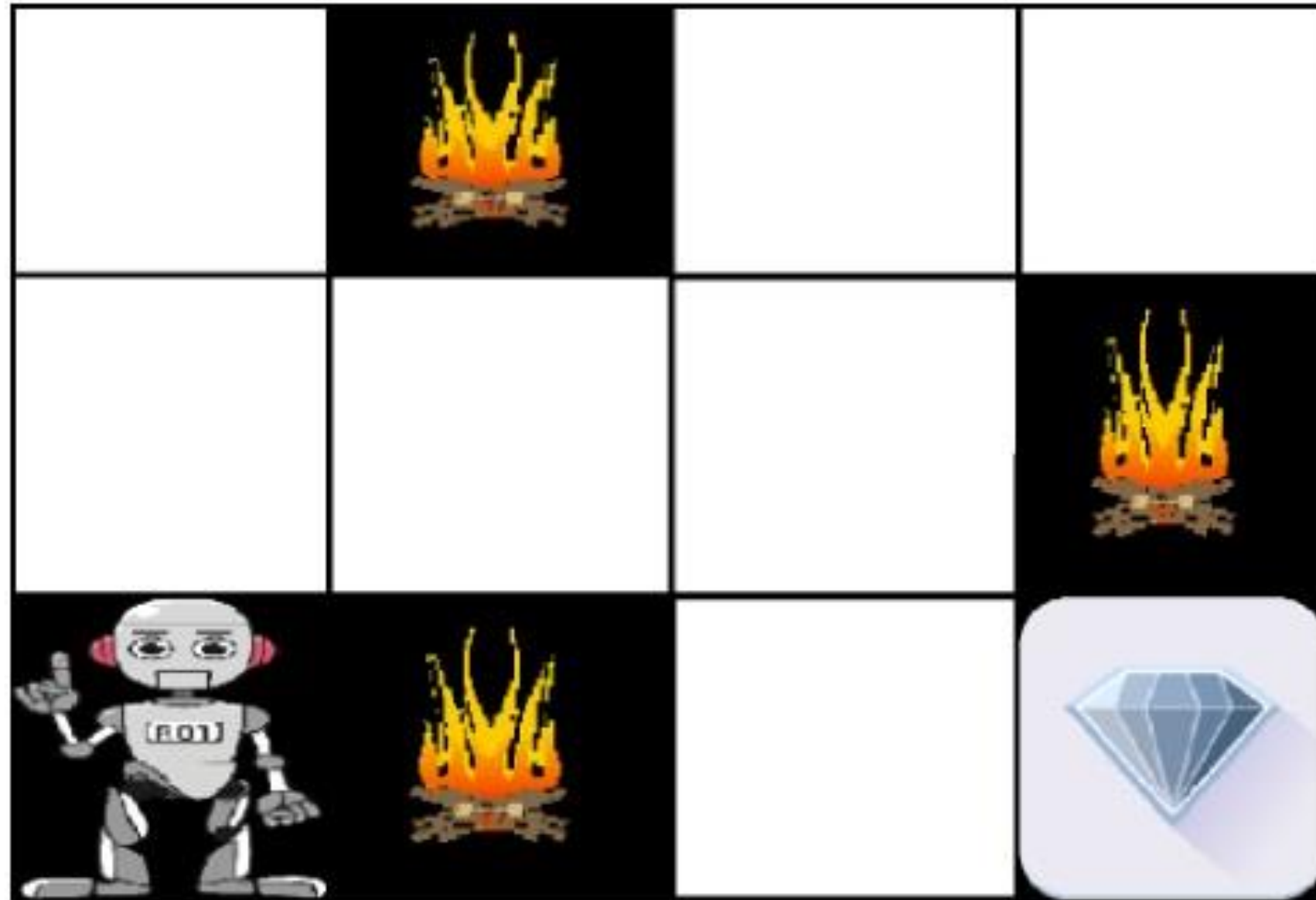


Reinforced Learning

- Reinforcement Learning (RL) is the science of decision making.
- It is about learning the optimal behavior in an environment to obtain maximum reward.
- In RL, the data is accumulated from machine learning systems that use a trial-and-error method.
- Data is not part of the input that we would find in supervised or unsupervised machine learning.



Reinforced Learning





ASSESSMENT



1. What is the goal of Artificial Intelligence?

- a) To solve artificial problems
- b) To extract scientific causes
- c) To explain various sorts of intelligence
- d) To solve real-world problems





ASSESSMENT



2. In how many categories process of Artificial Intelligence is categorized?

- a) categorized into 5 categories
- b) processes are categorized based on the input provided
- c) categorized into 3 categories
- d) process is not categorized

It is categorized into 3 steps Sensing, Reasoning, Acting

- i) Sensing: Through the sensor taking in the data about the world
- ii) Reasoning: Reasoning is thinking or processing the data sensed by the sensor.
- iii) Action: On the basis of input and reasoning, acting is generating and controlling actions in the environment.





ASSESSMENT



3. Which of the following is not an application of artificial intelligence?
- a) Face recognition system
 - b) Chatbots
 - c) LIDAR
 - d) DBMS

Face recognition system, Chatbots, and LIDAR are the various applications of AI in various fields like security system, business, automobiles etc.

DBMS is used to store and manipulate data.

