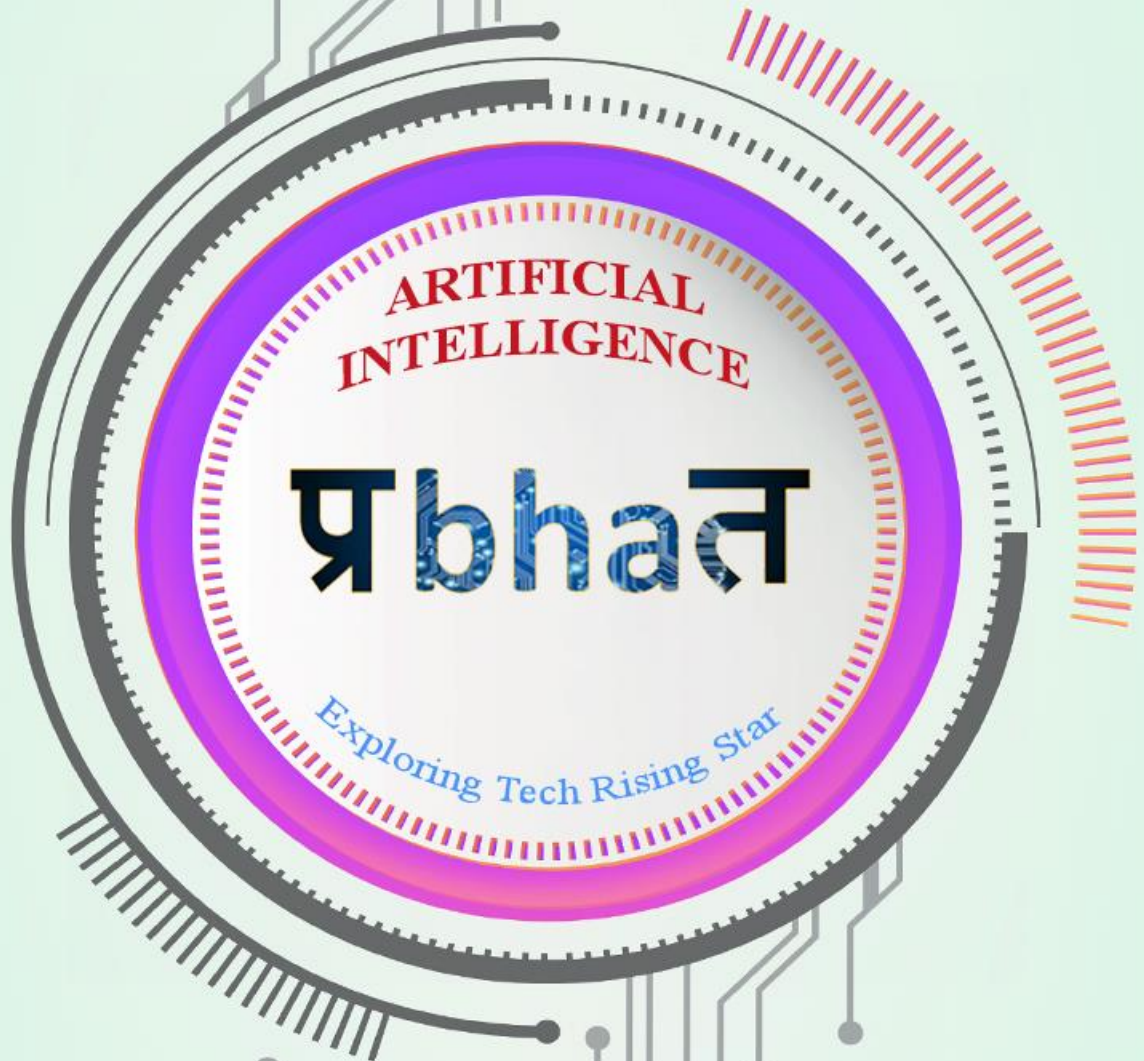


Newsletter 2022 Issue II



**Bharati Vidyapeeth's
Institute of Management and Information Technology
Navi Mumbai**

**BHARATI VIDYAPEETH'S
INSTITUTE OF MANAGEMENT AND INFORMATION TECHNOLOGY
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BVIMIT fortifies student's intellectual awaking and social transformation in different spheres that makes them to contribute to the organization and world as well. We strengthen student's hard work and commitments towards knowledge.

BVIMIT provides MCA, VI semester course enables overall development of students and give a different perspective towards corporate life.

Current newsletter entitled "**PRABHAT-exploring tech rising star**" is a combined effort of students and staff members that commences articles on emerging technologies with theme as "**ARTIFICIAL INTELLIGENCE**" provides articles for the same.

I hope "**PRABHAT**" will take you to the world of prominent technologies.

Editorial Desk



Dr. Pratibha Deshmukh
Editor-in-chief

It is indeed a great honor to be the Newsletter Editor for me and also an immense pleasure to launch the first edition of BVIMIT Newsletter “PRABHAT- exploring tech rising star”.

As we are living in the technological era, we have selected the topic for the article as “**ARTIFICIAL INTELLIGENCE**” to make students aware about this emerging technology. It aims to be a truly interdisciplinary platform seeking to bring together a range of diverse voices on the topic in order to stimulate discussion.

A huge thank you to all the students who contributed writing the articles, without which there wouldn't have been this newsletter.

I appreciate PRABHAT student members for their everlasting support throughout the creation of this edition.

I hope “**PRABHAT**” will convey some technical knowledge to you.



SWARAJ WADKAR



SURAJ RAUT

MCA Students

Bharati Vidyapeeth's Institute of Management and Information Technology

Navi Mumbai

ARTIFICIAL INTELLIGENCE: KNOWLEDGE REPRESENTATION

I. Knowledge Representation

Humans are best at understanding, reasoning, and interpreting knowledge. Human knows things, which is knowledge and as per their knowledge they perform various actions in the real world. But how machines do all these things comes under knowledge representation and reasoning. Hence we can describe Knowledge representation as following:

- Knowledge representation and reasoning (KR, KRR) is the part of Artificial intelligence which concerned with AI agents thinking and how thinking contributes to intelligent behaviour of agents.
- It is responsible for representing information about the real world so that a computer can understand and can utilize this knowledge to solve the complex real world problems such as diagnosis a medical condition or communicating with humans in natural language.
- It is also a way which describes how we can represent knowledge in artificial intelligence. Knowledge representation is not just storing data into some database, but it also enables an intelligent machine to learn from that knowledge and experiences so that it can behave intelligently like a human.

Following are the kind of knowledge which needs to be represented in AI systems:

- **Object:** All the facts about objects in our world domain. E.g., Guitars contains strings, trumpets are brass instruments.
- **Events:** Events are the actions which occur in our world.
- **Performance:** It describe behaviour which involves knowledge about how to do things.
- **Meta-knowledge:** It is knowledge about what we know.
- **Facts:** Facts are the truths about the real world and what we represent.
- **Knowledge-Base:** The central component of the knowledge-based agents is the knowledge base. It is represented as KB. The Knowledgebase is a group of the Sentences (Here, sentences are used as a technical term and not identical with the English language).

Knowledge: Knowledge is awareness or familiarity gained by experiences of facts, data, and situations. Following are the types of knowledge in artificial intelligence:

II. Various types of knowledge

Following are the various types of knowledge:



Declarative Knowledge

- Declarative knowledge is to know about something.
- It includes concepts, facts, and objects.
- It is also called descriptive knowledge and expressed in declarative sentences.
- It is simpler than procedural language.

Procedural Knowledge

- It is also known as imperative knowledge.
- Procedural knowledge is a type of knowledge which is responsible for knowing how to do something.
- It can be directly applied to any task.
- It includes rules, strategies, procedures, agendas, etc.
- Procedural knowledge depends on the task on which it can be applied.

Meta-knowledge

- Knowledge about the other types of knowledge is called Meta-knowledge.

Heuristic knowledge

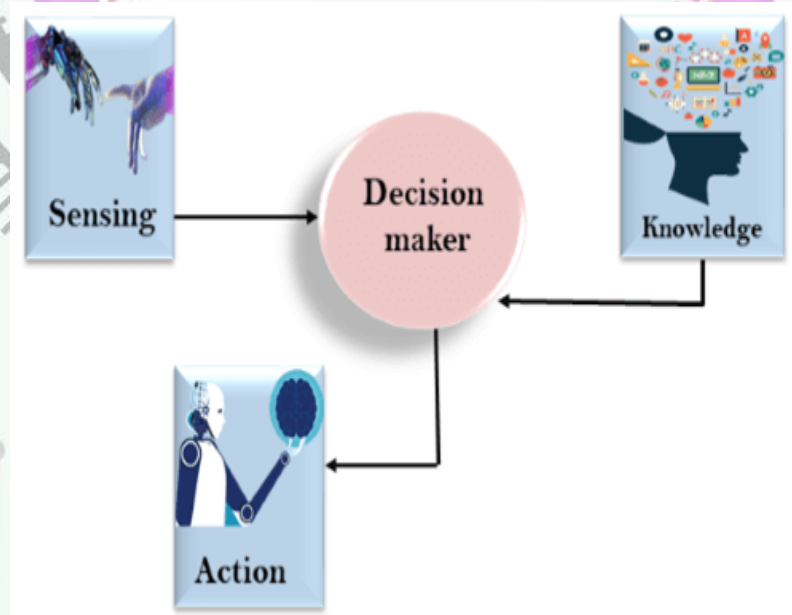
- Heuristic knowledge is representing knowledge of some experts in a field or subject.
- Heuristic knowledge is rules of thumb based on previous experiences, awareness of approaches, and which are good to work but not guaranteed.
- Structural knowledge
- Structural knowledge is basic knowledge to problem-solving.
- It describes relationships between various concepts such as kind of, part of, and grouping of something.
- It describes the relationship that exists between concepts or objects.

III. The relation between knowledge and intelligence

Knowledge of real-worlds plays a vital role in intelligence and same for creating artificial intelligence. Knowledge plays an important role in demonstrating intelligent behaviour in AI agents. An agent is only able to accurately act on some input when he has some knowledge or experience about that input.

Let's suppose if you met some person who is speaking in a language which you don't know, then how you will be able to act on that. The same thing applies to the intelligent behaviour of the agents.

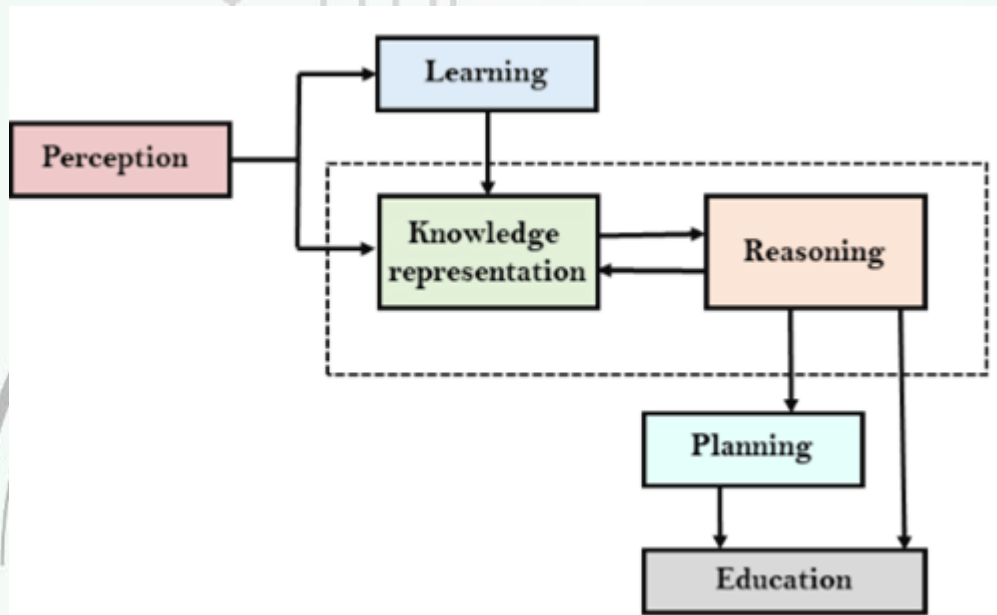
As we can see in below diagram, there is one decision maker which acts by sensing the environment and using knowledge. But if the knowledge part will not be present then, it cannot display intelligent behaviour.



IV. AI knowledge cycle

An Artificial intelligence system has the following components for displaying intelligent behaviour:

- o Perception
- o Learning
- o Knowledge Representation and Reasoning
- o Planning
- o Execution



The above diagram is showing how an AI system can interact with the real world and what components help it to show intelligence. AI system has Perception component by which it retrieves information from its environment. It can be visual, audio or another form of sensory input. The learning component is responsible for learning from data captured by Perception compartment. In the complete cycle, the main components are knowledge representation and Reasoning. These two components are involved in showing the intelligence in machine-like humans. These two components are independent with each other but also coupled together. The planning and execution depend on analysis of Knowledge representation and reasoning.

V. Applications of AI through Knowledge Representations

- Expert systems: Expert systems are computer programs that mimic the decision-making abilities of a human expert in a particular domain. They use knowledge representation techniques to store and manipulate large amounts of domain-specific knowledge.
- Natural language processing (NLP): NLP is a subfield of AI that focuses on enabling computers to understand and process human language. It relies on knowledge representation techniques to represent the meaning of words, sentences, and entire texts.
- Robotics: Robots need to have a structured representation of the world and their surroundings in order to function effectively. Knowledge representation techniques are used to represent the robot's understanding of its environment, allowing it to reason about its actions and make decisions.

- **Planning and scheduling:** Planning and scheduling systems use knowledge representation techniques to represent tasks, constraints, and other factors that must be taken into account when making scheduling decisions.
- **Recommender systems:** Recommender systems use knowledge representation techniques to represent the preferences and interests of users, and then use that information to recommend items (such as movies, books, or products) that they might be interested in.

