Review Article

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A Study on Artificial Intelligence Libraries of Indian Society: An Overview

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Abstract

The AI is one of the important areas of computer/data science allowing a machine to perform tasks in a way similar to a human performing them. Its main goal is giving machines the ability to process information and make decisions based on that information, the same ways humans do. However, the science and the industry of AI are far from being fully explored and developed. AI is becoming increasingly prevalent in many applications; it is not going to completely replace human operators. In the long run, AI is expected to enhance human abilities and be the dominant technology of the future libraries.

Keywords: Information Technology; Hardware; Library automation Technology.

INTRODUCTION

IA the invention of computers, humans have been developing various approaches to increase operational speed and decrease physical size in diverse types of hardware and applications. While expanding the uses of computer systems, humans were interested in exploring whether a machine can think, work and behave like a human. A science and a set of computational techniques that are inspired by the way in which human beings use their nervous system and their body to feel, learn, reason, and act.

AI allows machines or computers to perform in an intelligent manner. For AI to work, availability of "data" is the main key (Joshi, 2020). Humans need some device or software that can process and handle the large amounts of data with minimum effort and speed. This handling of data and processing is known as data science. Data science can be defined as the "scientific study of data, that stores, records and analyses data for the benefits of society".

Definitions of Artificial intelligence

1. ***John McCarthy,*** Artificial intelligence is "the science and engineering of making intelligent machines, especially intelligent computer programs". In other words, AI can be defined as "a branch of computer science

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by which we create intelligent machines which can think like human, act like human, and able to make decisions like human." (McCarthy, 2019, pp. 2–3). AI in a sense is the simulation/replication of intelligence processes by computer systems that can think and act rationally in the way similar to humans.[1,2]

2. ***Bellman (1978):*** The automation of activities that we associate with human thinking, activities such as decision making, problem solving, learning".[3]
3. ***Schalkoff (1990):*** A field of study that seeks to explain and emulate intelligent behavior in terms of computational processes.[4]

Increased computational power and volume of available data has increased the use of AI in the late 1990s, and this trend is accelerating. AI has enhanced the use of natural language processing, computer vision, robotics, machine learning, deep learning, etc. AI is useful in controlling vehicles, diagnosing diseases, and predicting behaviors. Recently, the 18-times historic defeat of World Go champion Lee Sedol by Google DeepMind's AlphaGo has proved the capabilities of intelligent machines.

AI can automate repetitive learning through the datasets. But AI has some basic differences from hardware driven automation, as it can perform continuous, large volume tasks reliably (Iyer, 2018). For such automation, some human intervention is still required to initialize the system. Automation, communication platforms, and machines can be integrated together with massive data to apply to several new applications. Given that AI adds intelligence to existing processes, it cannot be viewed as an independent application. For example, in new generation Apple products, the Siri is included as a useful feature.

AI is composed of two words, "artificial" and "intelligence," where "artificial" stands for "human created' and "intelligence" stands for "thinking power." In other words, AI is "a man made object with thinking power'. The intelligence is intangible which may be described as "the ability of a system to calculate, reason, perceive relationships and analogies, learn from experience, store and retrieve information from memory, solve problems, comprehend complex ideas, use natural language fluently, classify, generalize, and adapt new situations".

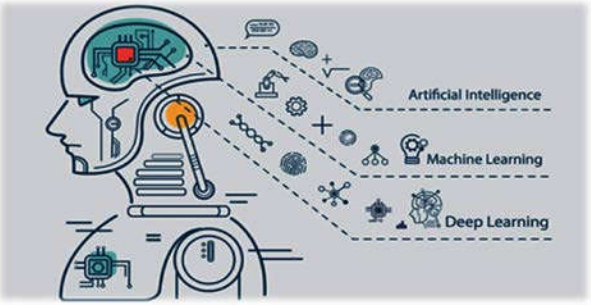
Processes Involved with AI

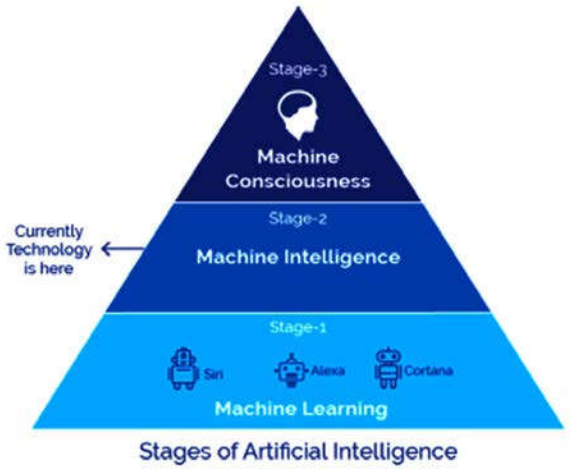
The AI programs will have cognitive skills: reasoning, problem solving, learning, perception, and self correction, as given below (McCarthy, 2019)[5]:

1. ***Reasoning Process:*** The AI program here focuses on selecting the most appropriate algorithm to achieve the required results. It is the process that is used for making judgments, decisions, and predictions. Reasoning processes are mainly categorized as inductive reasoning and deductive reasoning.
2. ***Learning Process:*** Its function is acquiring data and creating rules in order to devise actionable information from data. Learning improves understanding of the subjects under study. The rules, also called algorithms, help provide sequences of instructions to perform a task using computing devices. It involves acquiring knowledge by way of study, practice, and gaining experience. Humans, some animals, and AI-based systems have the ability to learn (Rouse, 2020).
3. ***Problem-Solving Process:*** It is used to get the required solution from the current situation by taking another approach. Problem solving may include decision making, *i.e.*, selecting the best out of several possible alternatives to get the objectives.
4. ***Perception Process:*** It includes selecting, acquiring, interpreting, and ultimately analyzing the information. In case of humans, perception is supported by sensory organs. Perception mechanisms in AI place the sensors data together in a useful manner.
5. ***Self-correction Process:*** It is designed to continually refine the algorithm so that it determines the most accurate results.

Future of Machine Learning towards Mind thinking

Artificial Intelligence and its Applications in Libraries:

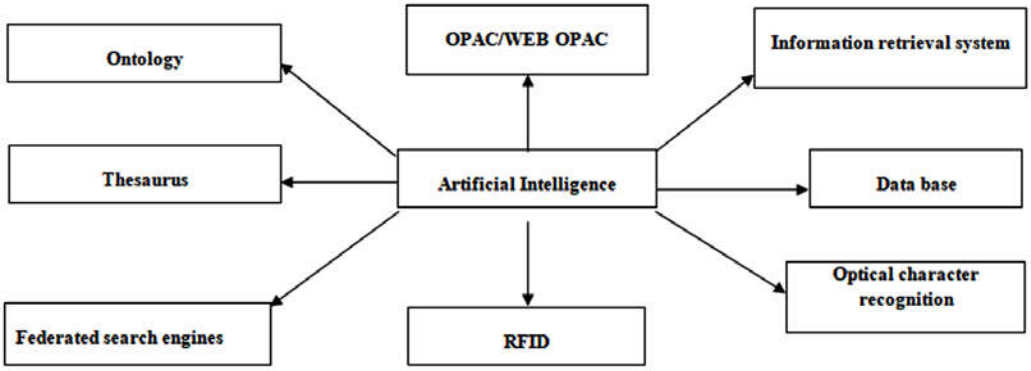




- An Expert System helps the librarian in realizing the need for an improvement in the library operations and services.
- A well programmed Expert System improve the quality of the operations and services.

The expert system works as a substitute for a reference librarian

- Ask Librarian



APPLICATION OF EXPERT SYSTEMS

Classification

Sl. no.	Expert System	Application
1	**Coal SORT** (Semantic Network)	• A knowledge based interface • Designed to serve either as a search or an indexing tool
2	**BIOSIS** (An Indexer Aid)	• To assign documents to categories automatically • The indexing languages are structured and practical representation of information. • Uses the information in the titles of biological documents.

Focused on descriptive cataloguing because it is considered rule-based (AACR2)

A Human machine interface

An Expert System with full cataloguing capability

Refsearch

- Can be used to teach student's reference skills.
- As a computerized aid for practicing reference librarians and information specialists.

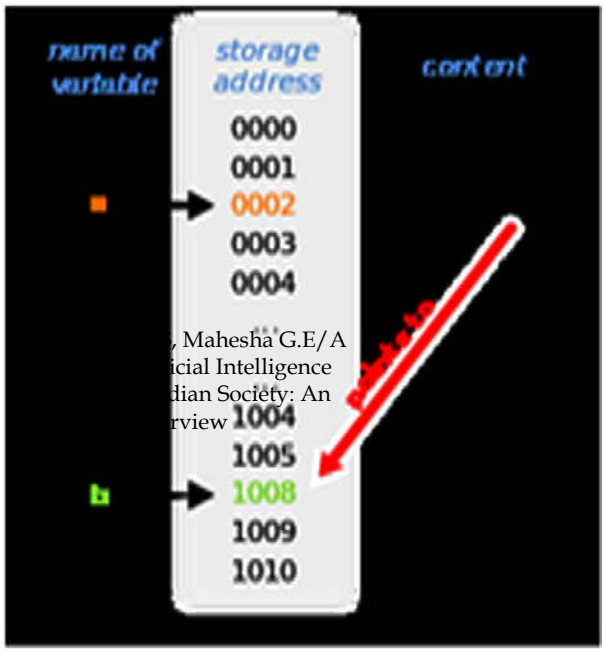
As a computerized aid for practicing reference librarians and information specialists.

Plexus

A referral tool used in Public Libraries

Point

Directs the user of the refence resource



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Advantages of Artificial Intelligence

1. Can take on stressful and complex work that humans may struggle cannot do.
2. Can complete task faster than a human can most likely.
3. To discover unexplored things e.g., outer space.
4. Function is infinite.

Disadvantages of Artificial Intelligence

1. Lack of human touch
2. Has the ability to replace human jobs.
3. Can malfunction and do the opposite of what they are programmed to do.
4. Can be misused leading to mass scale destruction.
5. May corrupt younger generation.

The Benefits of Artificial Intelligence in Libraries

Generally speaking, artificial intelligence is installed in machines or computers to reduce human casualties in wars, hazardous work environments, car accidents, plane crash, fire explosion or disasters as a result of human error. Furthermore, artificial intelligence facilitates human work with greater speed, efficiency and effectiveness in work environments such as the library. Library clientele who are carrying out research by combing the library database in an instant. Generally speaking, artificial intelligence systems can read to you, inform you, advice you, teach you, correct your mistakes, and patiently respond to your myriads demands. Thus, artificial intelligence holds great potentials for library and information service. A good librarian, through working with a user, can

provide a much better tailored service, potentially using up time freed up by using AI. IFLA Library Policy and Advocacy Blog.[6]

The benefits of Artificial Intelligence in Libraries can be Summarized as follows:

1. According to Ex Libris (2019), artificial intelligence in libraries can make research more discoverable which can boost research productivity among faculty members, 136 Artificial Intelligence in Libraries.[7,8]
2. ***Bridge in Time:*** Round the clock accessibility to information resources and services just in time.
3. ***Bridge in Space:*** The space occupied by piles of books, journals, bound newspapers and other information materials has been reduced by the introduction of digitization, electronic copies and use of robotic cranes that stores and retrieve books from a compact off-site storage location.
4. ***Maximization of Efficiency:*** This refers to efficiency in library operations: selection and acquisition of materials, technical services, circulation services, references services, serial management etc.
5. Maximization of effectiveness in form of improves services delivery and elimination of human errors in library operations.
6. ***Minimization of Effort:*** The effort expended by librarians in technical services, circulation services, references services, serial management etc, can been minimized by the use of artificial intelligence systems in libraries.
7. Enhanced and immersive user experience in library services delivery.

Challenges of Implementing Artificial Intelligence in Libraries

Artificial intelligence systems are generally not in operational use in most libraries today.

The limitations to implementing artificial intelligence systems in libraries include the following:

1. Lack of technical know how to use and operate artificial intelligence systems among the library staff.
2. Lack of adequate funding to develop or procure artificial intelligence systems in libraries. Since the budgets for hardware and software are frequently tight, there's always constrain to the type of system the library can purchase or develop.
3. High system development and maintenance cost of artificial intelligence systems in libraries.
4. Erratic power supply to power artificial intelligence systems in libraries especially in developing countries.
5. Inherent complexities of expert/artificial intelligence systems' development.
6. Limited natural language capabilities.
7. Intelligent systems lack that common base of human knowledge, severely constraining the types of functions that they can perform.
8. Limited amount of artificial intelligence experts among library automation vendors. The field of artificial intelligence is complex and thus, requires a specialized knowledge in that aspect far beyond the development of conventional.

CONCLUSION

Despite AI's promises to bring forth new opportunities, there are certain associated risks that need to be mitigated appropriately and effectively. To give a better perspective, the ecosystem and the socio-technical environment in which the AI systems are embedded needs to be more trust worthy. library work nature it should be save the time and develop the technical issues.

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