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Role of Artificial Intelligence

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ABSTRACT

Artificial intelligence (AI) in libraries refers to the growing trend of programming computers to perform tasks that traditionally role on human intelligence. The ultimate goal is to develop computer systems or machines that can think and act like humans, potentially revolutionizing the field of librarianship. Including expert systems to provide reference services, robots that perform tasks such as reading and shelving, and virtual reality for experiential rich learning. Although some fear that the integration of AI will create a divide between librarians and users, it is more likely that it will enhance their capabilities rather than replace their roles. This will lead to better service delivery, ultimately enhancing the relevance of libraries in our ever-changing digital society. This article aims to investigate different uses of AI in libraries, including concepts such as expert systems, natural language processing, pattern recognition, and robotics. It also explores the pros and cons of AI. In recent years, there has been a resurgence of interest in AI. This article aims to gather perspectives on how AI could impact academic libraries and consider the implications for library workRespondents emphasized the impact of AI on research and resource discovery, scientific publishing, and learning. Challenges include concerns about libraries ignoring development priorities, ethical considerations, transparency in AI decisions, and data quality. Some see it as a potential threat to jobs. The study identified different potential roles for academic libraries, such as collecting and managing data, acquiring AI tools and building infrastructure, and supporting users to navigate data direction and control. This article stands out as one of the first examinations of current expectations regarding the impact of AI on academic libraries. The authors propose the concept of smart libraries to encompass the potential influence of AI on libraries.

Introduction:

The integration of artificial intelligence in the digital library not only change the traditional library services but also brings a new paradigm to redefine our integration with the information The idea of creating computers or machines capable of thinking and acting like humans has fascinated many people. Humans have a natural ability to perceive, think and act, and this ability will improve over time.[1] Artificial intelligence aims to replicate this in computers. Artificial intelligence not only enables learning but also improves performance without explicit programming. Computers excel at recognizing and absorbing patterns on a larger scale than humans. Artificial Intelligence is integrated into various aspects of daily computing. Most modern systems and phones utilize AI, including speech recognition, natural language processing, self-driving cars, and robotics. AI's strength lies in its ability to discern patterns faster and on a larger scale than humans. Libraries must adapt to advancements in AI and technology to stay relevant. Smart library systems driven by AI are on the horizon. Experts believe we are on the cusp of fully realizing the impact of AI in a variety of environments, including offices, factories, libraries and homes.

Objectives

1- Understand what artificial intelligence (AI) is.
2- Discovering the potential of AI in digital libraries.
3- To identify the problems and challenges faced by digital libraries in the Indies and provide possible suggestions to overcome the problems.

Methodology

The study uses descriptive and substantive evaluation methods. Researchers critically evaluate her ES/AI and robotics related articles in the library. Technology: This group contains researched and reviewed articles about library information management systems. Therefore, applying his ES techniques such as inference engines and fact/rule bases increases the efficiency and accuracy of the system under consideration.

Services: Articles in this group propose ES or related technologies and methodologies that can be combined and integrated with ES or AI to provide public or technical services. Public services are provided to end users to meet their information needs, and technical services are provided to librarians and professional users involved in library operations.[2] This study is based on a qualitative approach using content analysis techniques. A large amount of literature is searched to obtain the research results. Searches were performed in various academic online databases and limited to English language sources only. Only issues and challenges faced by digital libraries in India are considered**.**

Rationals For Impemenrting Artificial Intelligence In Library-

Libraries have undergone significant transformations, both in structure and content, in different historical eras: since ancient times, using tablets and clay stones to transmit information, through the medieval period with the use of papyrus tablets and parchment, to the modern era using paper, microforms and now digital or electronic media. Throughout these eras, libraries have organized and managed many different types of information resources to meet the information needs of their user communities... Traditionally, a library has been defined as a physical space containing books for reading and other purposes... However, the modern definition of a library has expanded beyond its physical boundaries, now focusing on the collections and services provided... Virtual libraries, without physical boundaries, can provide services to remote users. Therefore, trying to meet the dynamic information needs of customers while remaining relevant to our ever-changing technological society, libraries have adopted and adapted too many other technological revolutions... From clay tablets and stones to papyrus, parchment, paper, microforms, computers, the Internet, virtual libraries, libraries 2...0 and cloud computing, among many others.[3] It is worth noting that

artificial intelligence stands out as a current technology with great potential and promising applications in libraries... Therefore, it is imperative to explore this technology, consider its advantages and disadvantages to take full advantage of its rich advantages to provide innovative and optimal services in libraries. As Corked points out, artificial intelligence systems (robots) are poised to become an important technology in this century. Essentially, the main reason for implementing artificial intelligence systems in libraries is that their error potential is reduced compared to humans. They can work 24/7 without getting tired, freeing librarians for other tasks. Finally, because computers can operate with efficiency and speed that exceed human capabilities, they will improve the speed, efficiency, and effectiveness of library material processing and enhance service delivery. Services for all levels of libraries. This chapter will be focus on the concepts, foundations, application and advancement in the field of artificial intelligence in libraries, application of robots, virtual, augmented and mixed realities in libraries, their promises, benefits and demerits they hold for future libraries.

Concepts of Artificial Intelligence

Additionally, artificial intelligence is the programming and development of computers to perform intelligence tasks required by humans. Similarly, the McGowan-Hill Encyclopaedia of Science and Technology states that artificial intelligence is a branch of computer science that focuses on understanding the nature of intelligence and building computer systems capable of applicable intelligent behaviour. Other definitions of artificial intelligence include: Creating machines with minds, the study of intellectual abilities through the use of computer models to describe and simulate intelligent behaviour under specific conditions. In other words, artificial intelligence makes computers and machines as intelligent as humans, enabling them to find solutions to complex problems in a humane way.[4] Examples: learning new concepts and tasks, thinking about specific tasks and drawing useful conclusions, natural language processing, recognizing and understanding visual scenes, etc. Computers with powerful artificial intelligence can think and make decisions just like humans. Weak artificial intelligence computers cannot think, learn, or reprogram themselves, but are specifically designed to respond to specific situations. Robust AI refers to computer systems or machines that have human-like intelligence, including human-like learning, thinking, and decision-making. Weak artificial intelligence, on the other hand, refers to computer systems that are designed for a specific task and lack the ability to think, learn, or adapt beyond their programmed capabilities.

Trends In Artificial Intelligence

Advances in artificial intelligence include autonomous or self-driving cars, navigation systems, human-computer games, fraud detection, robotics and machine learning - artificial intelligence applications. Giving computers or machines the ability to learn from data gathered from past experiences, reprogramming and improving themselves without human intention Machine learning is simply a computer teaching itself through iterations and past experiences with data. Additionally, artificial intelligence includes the following general research areas automatic programming, computer vision, intelligent control systems, expert systems, intelligent computer-aided guidance, image processing, natural language processing, planning and decision support, robotics.[5] The Washington Post uses an AI system – Heliograph to cover elections, while IBM`s Watson machine learning engine provides real-time ratings, analysis, scores and annotations for events. According to Harris AI created a significant breakthrough in education when IBM developed Teacher Advisor, an AI system designed to help teachers develop personalized lesson plans. Semantic Scholar uses machine learning and other AI systems to help academics research resources more efficiently as more research is published.[6]

Artificial intelligence systems have been broadly classified from two different perspectives as outlined.

1. The degree of their intelligence. In this perspective, artificial intelligence systems are classified into: (1) reflex agents able to respond to stimulus from sensors such as heat sensor, light sensor, motion detection etc. (2) utility-based system. (3) goal-oriented systems. (4) Learning system such as machine learning systems that can teach computer programming.
2. The nature of their functionality. From this perspective, artificial intelligence systems can be classified into. (1) Collaborative systems. (2) Response system. (3) 4,444 Internet-based systems. (4) Mobile systems can move autonomously from one location to another to perform tasks.

Foundations of Artificial Intelligence;

In accordance with the McGraw-Hill Encyclopaedia of Science and Technology, artificial intelligence is built upon four fundamental pillars: representation, search, reasoning, and learning. These cornerstones serve as essential prerequisites for any artificial intelligence system.

Representation

This pertains to the internal portrayal of the problem or the related knowledge within the intelligent system. It encompasses the knowledge-based framework of the system for problem identification, as well as the architecture for its manipulation. For instance, in an expert system for diagnosis, representation would involve describing the symptoms and characteristics of a person with a particular ailment. In the case of a mobile robot, it might involve a symbolic 3D representation of a room.[7]

Search

This constitutes a crucial facet of artificial intelligence systems used in problem-solving approaches. In some instances, heuristic search techniques are employed to adapt to the specific problem at hand. An example of a search operation could be querying a database for past problems and their corresponding solutions to find the closest match for the current problem.

Reasoning

This is aimed at translating knowledge into solutions for problems, representing the heart of the system`s intelligence. Reasoning can encompass both deductive and inductive approaches, where existing knowledge is used to derive a set of potential solutions or to formulate a hypothesis that best fits the available knowledge and potentially addresses the current problem. Expert systems, for example, rely on reasoning to arrive at solutions based on a set of rules or knowledge base established by human experts to address specific problem scenarios.

Learning

The learning capability of intelligent systems enables them to adapt and accumulate intelligence by assimilating the system's history or knowledge base. Learning involves aspects such as reconfiguring representation, fine-tuning search heuristics, updating knowledge, and enhancing reasoning abilities. Common learning methods in artificial intelligence systems encompass statistical learning (utilizing the frequency of different types of historical events to inform future actions or develop inductive hypotheses), neural networks (training networks on existing knowledge and applying them to solve problems), and reinforcement learning (rewarding or penalizing actions taken by an artificial intelligent system based on their accuracy in problem-solving).[8] These methods fall under the umbrella of machine learning and deep learning."

Application Of Artificial Intelligence In Library-

Artificial intelligence and its applications in libraries Artificial intelligence technology today. AI is better at intellectual tasks, and the main goal is to find any technology that can quickly do the job better.

1- Implementation of the expert system in the work of the library:

Activities related to library reading material, users and staff. Expert systems where dialogue between staff and users, between users and the database can be seen The expert system helps the librarian to understand the need of the library A well-programmed expert system also improves.

(I) Applications of expert systems in the reference service: Reference service is the most important function of any library and Expert System does it Expert systems used for referral service. As a computer aid for practicing librarians and information specialists.
(**ii) Field of reference work**. It directs users to reference sources; this is not Information use of an academic reference librarian for low- and intermediate-level questions and data system.ORA consists of directed transactions as a library.
(iii) Answer: a knowledge-based system to help users with reference questions external databases and CD-ROM reference tools.
(iv) PLEXUS: This is a reference tool used in public libraries. Benchmarking process, searching for information on certain fields, reference sources, and library users. Source books and factual information.
2- Application of an expert system in cataloguing: cataloguing through Expert Systems is focused on descriptive cataloguing because it is considered rule-based (AACR2). Cataloguing of information technologies b) Expert system with full catalogue capabilities with electronic publishing every attempt to convert to AACR2 had problems highly structured rules necessary for an expert system to work.[9]
3- Application of an expert system in classification: Classification is the basic function of organizing information. It therefore stands out in all library information organization systems and Implementation of an expert system in the field of classifications Karba SORT: This is a conceptual browser designed to function as either a search engine or a search engine Coal SORT consists primarily of a framework-based semantic network and the Semantic Web. There is no procedural knowledge in the system. coal SORT in that both are concentrating on enhancing interface using a Knowledge semantic network of concepts and a set of template that express the patterns called the These patterns are referred to as conceptual knowledge, to assign documents to categories automatically. Help BIOSIS uses the information in the headers of biological documents to determine as much as possible into categories that human indexers would define. Indexing.
4- Using the expert system for indexing: Journal indexing is another area where expert systems are being developed. Indexing a journal article involves identifying concepts in order to translate them concepts into verbal descriptions and selecting and defining guided vocabularies which conceptually correspond to verbal descriptions. Based on the information provided by the crawler, systems can Med Index is the best example of an index system used in library indexing. Very few library users interacted with information-based systems. Users have very little exposure to these systems, as most of them are is not complete enough to be used by the everyday library patron. Reference collection is another integral part of the library. Library users have several systems are involved.[10] A point-by-point decision made by a specialized bibliographer when selecting a monograph. Sufficient for the library to receive the desired data from the machine.

Application Of Natural Language Processing In Library Activities –

When we think of the term NPL, the first thought that may come to mind is capacity speak or type a complete sentence and let the machine process the request and speak. Informatics and more specifically searching in a database, for example publicly on the web Indexing is the basis of document retrieval. accuracy, proportion of relevant documents retrieved; and remember Keywords that were which the indexer emphasized as the basis of a person's thinking on a given subject on the computer screen when these keywords are put together in the correct order using the word caravan vs. trailers[11] Library patrons may not recognize the ambiguity of their search strategy. Natural language searches in the Dialog database would allow library users to search using an electronic catalog in a library may want the cataloguer to understand a complete sentence, such as “Find all sources that mention nature language processing for library science and informatics.” Human librarian the advantage is that it is trained in search and querying and natural language and can acts as an intermediary between the machine and the library patron. Case sensitive In the future, it may

be possible to use natural language for access Library users acquire IT skills to take advantage of this.

Application of Pattern Recognition In Library Activities;

Emerging categories of information systems applications are being swept into office life multimedia systems, geographic information systems and collaborative computing electronic commerce has created tremendous opportunities for information researchers as applications become more overwhelming, urgent and versatile, several well-known information problems have become even more pressing in this web-centric information age. For example, automatic indexing and natural language processing are Image recognition often uses texture-, colour-, or shape-based indexing and segmentation techniques.[12] And video applications, voice recognition, speech recognition and scene segmentation techniques can be used to detect meaningful description in audio and video stream. Several category techniques were used for the semantic analysis of texts or multimedia objects. classification, statistical multivariate analyses, artificial neural networks and In this information age we believe that these techniques are good alternatives for processing analyses and brings together a large amount of versatile and rapidly changing multimedia information.[13] Networks, decisions, rules or predicate logic. One of the biggest trends in almost all information systems application development is Web-based text, image and video browsers have increased user expectations Information has also been made using advanced graphics workstations at affordable prices.

Application of Robitics In Library Activities

The robot is "automatically controlled, reprogrammable, and universal for mobile automation applications. Robots turn, roll, fly, as libraries offer an ever-increasing range of digital library services and resources, they continues to buy large quantities of printing material. the provision of electronic and printed resources and services has resulted in significant space requirements Comprehensive Approach to Printed Materials is to build a robot, on demand and batch scanning system that enables real-time browsing of printed material The user activates the CAPM system, which in turn activates the robot which searches for the desired system that opens the object and turns the pages automatically. According to the Centre for Digital Knowledge, the CAPM system allows for more than just browsing.[14]

Artificial Intelligence And Virtual Libraries

A virtual library is an electronic library that provides remote users with access to distributed information resources in electronic format. Virtual libraries typically provide remote access to a variety of content information resources through an online portal or gateway. Formats include online databases, e-books, e-journals, e-magazines, e-newspapers, and other traditionally offered services.[15] Digital and virtual library services are fully automated. Artificial intelligence plays a key role in library automation, especially in digital or virtual libraries where resources and services are fully computerized. Internationalization/translation of electronic resources (text, audio) using natural language processing and optical character recognition. This involves converting traditional library materials into electronic format through scanning or optical character recognition to facilitate searching and retrieval.[16] Expert systems/automated analysis and querying of audio-visual resources using optical character recognition. We use intelligent and highly automated systems to provide multiple access to information resources and 24/7 service.

Virtual Reality And Artificial Intelligence In Library Libraries Virtual Reality

(VR) is the use of computer technology to create simulatedenvironments. The virtual reality headset is equipped with his artificial intelligence capabilities such as computer vision, image processing, and voice recognition, creating a 3D artificial world that immerses users in her digital world in 360

degrees. Augmented reality enhances the user's vision by overlaying 3D objects onto real-world words. Mixed reality, on the other hand, allows digitally created objects to interact with real-world words.[17] Using a combination of virtual reality, augmented reality, and mixed reality in libraries improves the user experience and provides users with disabilities and remote users the opportunity to visit the library virtually. Similar to a traditional library environment, the user uses the virtual reality headset to move around the artificial library environment and interact with virtual library resources by simulating as many senses (sight, hearing, touch, smell) as possible. Additionally, virtual reality allows users to experience virtual presence (telepresence) within the library by immersing themselves in a virtual library environment rather than viewing from a computer screen. Since creating a virtual reality of all the information material in the library might seem to be difficult or time consuming, the combination of mixed reality & virtual reality can be used to link the enhanced robotic system for browsing/reading materials, so that when patrons from the virtual reality environment initiate an action to read a particular book, the book-reading robot is signalled/triggered to locate the physical book in the library in order to enable the virtual patron to browse through it via a live-feed of the pages of the book captured from the book-reading robot and transmitted to the virtual reality headset of the patron.Marquette (2019) reported that virtual reality, augmented reality and mixed reality could be used in libraries for immersive virtual field trips for patrons, such as a walk through the solar system, previewing sea animals or test-driving a new car. Already, applications exist that libraries can use to stimulate reality for their users for deeper learning experiences. It should be added that, the virtual reality headsets are a product of artificial intelligence systems that have gained applications in various field of science and engineering, medicine, aviation, military etc.[18]

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. Hardware and software budgets are often tight, so there are always limits to the types of systems libraries can purchase or develop.
3. System development and maintenance costs for artificial intelligence systems in libraries are high.
4. Intermittent electricity supply to power artificial intelligence systems, especially in libraries in developing countries.
5. Complexities inherent in developing expert/artificial intelligence systems.
6. Limited natural language ability.
7. Intelligent systems lack a common foundation of human knowledge, severely limiting the types of functions they can perform.
8. The level of effort and technical expertise required to create artificial intelligence systems in libraries. The extent and type of effort that must be invested in developing an intelligent library system is directly proportional to the performance and complexity of the system. This means that the more intelligent your system is, the more effort you need to put into it. Currently, there is a lack of experts with the expensive development tools and techniques required to develop advanced intelligent systems in libraries, or there is therefore a lack of such systems in libraries.[19]
9. The number of artificial intelligence experts in library automation providers is limited. The complexity of the field of artificial intelligence requires expertise in this area that goes well beyond the development of traditional library automation systems. Is. Therefore, before any significant and comprehensive work can be carried out in the field of artificial intelligence systems in libraries, it is necessary to recruit new staff in this field.

Conclusion

While it may seem like the field of librarianship may no longer exist and may disappear as a result of this inclusion, librarians should not harbour fears that using technology will help shape their work and his career. This can only be achieved if the necessary steps are taken to ensure that AI and robotics shape the future in a positive way. Libraries will benefit greatly from the development of artificial intelligence systems for technical services, reference services, circulation services, resource management, and information retrieval/dissemination. Although there is speculation that this technology will put librarians out of work, artificial intelligence will significantly improve library operations and service delivery, and increase the relevance of libraries in a society. As it the case with many emerging technologies, artificial intelligence is also seen as a common thread for librarians and the human touch in libraries. The eventual adoption and incorporation of artificial intelligence into library services will certainly reveal the many potential promises it holds in the librarianship profession. Many artificial intelligence applications have been deployed, demonstrating time and cost savings for commercial, industrial, military, scientific fields, academic and research institutions.AI applications and their utilities will increasingly be seen in many IT-oriented educational institutions, which provide AI-related accounts of their AI technology and utility in various fields. Libraries and information science would benefit greatly from the development of an efficient system of experts for technical services as well as information processing and management.

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