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Role of Artificial Intelligence in Library Services and Management

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Abstract

This article presents the role of artificial intelligence (AI) in libraries and its services and library operations. This study aims to provide researchers with a comprehensive understanding of artificial intelligence in a library context. The use of artificial intelligence in the library has become compelling. Artificial intelligence significantly improves the operation and services of libraries and updates and increases the importance of libraries in a constantly changing digital society. This systematic research aims to identify the uses and applications of artificial intelligence and machine learning in libraries. And AI also weighs in on data processing tools. The information presented here is a valuable resource for researchers interestingly on artificial intelligence in libraries.

I. INTRODUCTION

Artificial intelligence (AI) is the intelligence of computers or software, as opposed to human intelligence. Artificial intelligence (AI) considers information processing techniques found in libraries, including expert systems, natural language processing (NLP), pattern recognition, robotics, image processing, text mining, and accurate information processing for information users and digital content management. Technology based on artificial intelligence (AI) has the potential to drastically transform society and can be applied to foster creativity and the general good. If libraries adopt the necessary safety measures, consider ethical issues, and take into account current limitations, they can ethically use artificial intelligence technologies to serve their social goal. Building tools or algorithms that can replicate human cognitive processes is the aim of artificial intelligence. These tasks can involve learning, reasoning, problem-solving, speech recognition, natural language comprehension, visual perception, and more. Artificial intelligence (AI) research aims to achieve three goals: cognitive stimulation, AI applications, and AGI. The field of

behavioral finance, which combines economics and psychology, has discovered several cognitive biases that could lead to less-than-ideal investment decisions. Applications of artificial intelligence include RFID and wireless library service management, digital library search engines, and academic law libraries. The part libraries play in adopting AI technology and providing opportunities for lifelong learning to their communities.

The role of artificial intelligence in the library

One of the newest developments in information technology trends and library applications is artificial intelligence (AI). Libraries benefit from artificial intelligence because it is used to arrange and make vast amounts of information accessible. In the era of information explosion, artificial intelligence in library services guarantees the availability of correct information and serves as a helpful tool for readers and libraries to integrate naturally. Customer service and librarians benefit from the application of artificial intelligence in library services. An expert system connects artificial intelligence to the library catalogue. There are two ways to integrate artificial intelligence with the library catalogue: an electronic publishing system or a human-machine interface that allows us to manage the interaction between the information intermediary and the support system.

Uses of AI in Library

- Computer vision, artificial neural networks, machine learning, deep learning, natural language processing, artificial general intelligence, Concept of mind proficient system, Algorithm, reinforcement learning Chatbot, multi-agent system, speech recognition, cognitive computing, and intelligence amplification.
- AI applications in libraries include chatbots, shelf reading, collection development, document matching, content summarization, reference services, technical services, and content indexing. AI can speed up and improve the accuracy of the cataloguing and classification process by automating it. AI can also be used to answer basic informational queries, notify users when a book is due, direct users to pertinent library resources, and handle directional inquiries on a library website.

Librarians can utilize AI tools such as,

- Google Assistant, Voice Search, and Google Translate.
- Text data mining: This technique for identifying patterns is employed to obtain library materials and carry out internet searches.
- Natural language processing is used in these services (NLP).
- AI-enhanced indexing tools: These instruments can autonomously allocate keywords according to concepts found within a document.
- AI Chatbots: These devices can respond to straightforward or guided queries, notify users when a new book is released, and point users in the direction of particular library resources.
- Artificial Intelligence Applications in Library Services.
- Synthetic Intelligence AI can be used in libraries to increase the accuracy and efficiency of the data they store. AI can also boost learning and innovation, broaden information access, and improve the relevance and diversity of resources and services. To draw in customers, many libraries have changed the way they offer their services on social media.
- Users can store and manage pertinent information through these apps, which use artificial intelligence (AI) to manage and store data.

Applications of Artificial Intelligence in Libraries

Compared to perceptual tasks, AI performs better on intellectual tasks like playing computer games and proving theorems. These computer programs are sometimes created to stimulate human behavior. They are also designed for technological uses, like computer-aided instruction (CAI).

Even though artificial intelligence is a relatively new field, it has drastically changed society. The aim of its subfields, which include robotics, natural language processing, expert systems, and pattern recognition, is to use computers to mimic human intelligence. The following discusses a few of the most recent computational methods and domains that are applied in the rapidly evolving fields of artificial intelligence; Expert systems are knowledge-based computer programs that act as intelligence interfaces or gateways, granting users access to databases and pertinent data.

Expert System

Expert systems are knowledge-based computer programs that act as intelligence interfaces or gateways, granting users access to databases and pertinent data. Their scale varies from basic rule-based systems with flat data to extremely large, integrated developments that require years and numerous personnel to develop. A computer program that offers professional judgment, guidance, or suggested fixes for a particular circumstance is known as an expert system. The user interface, inference engine, and knowledge base are the various parts of an expert system.

Application of Expert Systems in Library Activities:

Activities in libraries about staff, patrons, and reading materials. Expert system applications that facilitate communication between users and databases, as well as between staff and users, seem very promising. The librarian will be assisted by an expert system in recognizing the need for increased productivity. Additionally, a well-programmed expert system will raise the standard.

i) Expert System Applications in Reference Service: One of a library's main functions is reference service, and an expert system can act instead of a reference librarian in this capacity. Here are a few instances of expert systems that are employed in reference services.

(ii) Expert system application for cataloguing:

One of the earliest library crafts is cataloguing. Because descriptive cataloguing is thought to be rule-based, recent attempts to automate cataloguing through expert systems have concentrated on it (AACR2). Applying artificial intelligence techniques to cataloguing can be done in two ways.

(iii) Expert system application in classification: The primary task in knowledge organization is classification. It is therefore prominent in all knowledge organization systems found in libraries and information centres. The following are examples of expert system applications in the field of library classifications:

(iv) Expert system application for indexing:

Another domain in which expert systems are being developed is the indexing of periodicals. When indexing a periodical article, concepts must be identified, and converted into verbal descriptions, and controlled vocabulary terms that conceptually translate to verbal descriptions must be chosen and assigned. The goal of automating the cerebral parts of indexing is to raise the quality and consistency of the indexing. The systems can

automatically determine appropriate preferred terms to assign pertinent subdivisions based on the information provided by the indexer. (v) Application of Expert System in Acquisition:

Applications of Natural Language Processing in Library Activities

Library users may be unaware of the ambiguity in their search strategy. Without the aid of an information specialist, library users would be able to directly search the Dialog database thanks to the use of natural language. When utilizing an electronic library catalogue, a user might want the catalogue to comprehend an entire phrase, such as "Find all your sources which contain a mention of natural language processing for the use of Library and information science." The human librarian can serve as a go-between for the machine and the library user and has the advantage of being trained in both natural language and search and query. A few URLs also have case sensitivities. It might be possible in the future to access data using natural language. For library users to benefit from this new technology, they must learn how to use computers.

Pattern Identification

It involves finding a strong match between a novel stimulus and patterns of previously stored stimuli. All living things go through this process continuously throughout their lifetimes. Numerous disciplines, including computer science, ethology, psychology, and cognitive science, study pattern recognition. The identification of patterns is predicated on statistical data that is derived from the patterns or on prior knowledge. Usually, groups of measurements or observations that define points in a suitable multidimensional space make up the patterns that need to be classified. Data collection, pre-processing, feature extraction, model selection and training, and evaluation are the elements that makeup pattern recognition. Library patrons must become computer literate to take advantage of this new technology.

Pattern Recognition

It is the process of establishing a close match between some new stimulus and previously stored stimulus patterns. This process is being performed continually throughout the lives of all living things. Pattern recognition is studied in many fields, including psychology, ethology, cognitive science and computer science. Pattern recognition is based on either a priori knowledge or on statistical information extracted from the patterns. The patterns to be classified are usually groups of measurements or observations, defining points in an appropriate multi-dimensional space. The components of pattern recognition are; data acquisition, pre-processing, feature extraction, model selection and training, and evaluation.

Application of Pattern Recognition in Library Activities

New and emerging classes of information systems applications have swept into the lives of office workers and regular people in this era of distributed multimedia computing and the Internet. Information practitioners and researchers now have a plethora of new applications at their disposal, including electronic commerce, digital libraries, multimedia systems, GIS, and collaborative computing. In this network-centric era of information, several well-known information retrieval issues have grown even more urgent as applications have grown more complex, demanding, and varied. Identifying

important features in objects is one of the most basic techniques in infrared photography. For instance, natural language processing and automatic indexing are widely used to automatically extract meaningful words. To identify images, segmentation and indexing techniques based on texture, colour, or shape are frequently employed. To find meaningful descriptions in audio and video streams, techniques like voice recognition, speech recognition, and scene segmentation can be applied to audio and video applications.

Robotics

Robotics is frequently defined as the branch of artificial intelligence that deals with perceptual and motor tasks. A robot is a mechanical device that uses artificial intelligence techniques to perform automation tasks under direct human supervision, under a pre-defined program, or following a set of general guidelines.

Robotics Applications for Library Activities

A robot is defined as "an automatically controlled, programmable, multipurpose manipulator that can be moved or fixed in place for use in automation applications and is programmable in three or more axes." The robots can roll, climb, fly, and scramble. On their own, they are figuring out how to get here. Libraries are still acquiring a lot of printed materials even as they offer an increasing number of digital library services and resources. Many libraries, particularly academic research libraries, are facing severe space constraints as a result of the combined pressure to provide resources and services that are both print- and electronic-based. The Comprehensive Access to Printed Material (CAPM) project aims to develop a robotic, batch, on-demand, and on-demand scanning system that enable real-time online browsing of printed materials. When the user activates the CAPM system, a robot will be sent to retrieve the requested item. This item will be delivered by the robot to another robotic system, which will automatically open the item and turn the pages. When the user activates the CAPM system, a robot will be sent to retrieve the requested item. This item will be delivered by the robot to another robotic system, which will automatically open the item and turn the pages. The Digital Knowledge Center's indexing software, along with currently in use scanners and optical character recognition (OCR) software, enable the CAPM system to search and analyze full-text generated from image data in addition to enabling text image browsing.

Artificial Intelligence Benefits

- a) Able to handle demanding and intricate tasks that humans might find difficult or impossible;
- b) Able to finish tasks more quickly than humans could;
- c) Able to discover uncharted territory, such as space;
- d) Fewer mistakes and flaws;
- e) The function is limitless;

Artificial Intelligence's Drawbacks

- a) Lacks the "human touch";
- b) Can replace human labour;
- c) Can malfunction and act contrary to programming;
- d) Can be abused, resulting in widespread destruction;
- e) May corrupt the next generation.

Libraries and AI Literacy

AI enhances libraries' roles in providing fair access to knowledge and instruction on the subject, encouraging the sharing of best practices and insights, and more. Creating a webinar on "Artificial Intelligence, Algorithmic Literacy and Roles for Libraries," which highlights the role of public libraries as educators in the face of AI, is one of the recent ULC initiatives. Another is organizing a forum on AI and digital citizenship. Libraries have joined in, promoting the course and encouraging more people to enrol. For instance, sixteen libraries around the nation hosted classes for individuals to enrol in the online course when the Junior version of the MOOC was launched in September 2019. People who are following the international version of the Finnish Elements of AI MOOC, for instance, can participate in a learning circle offered by the Toronto Public Library. A library AI maker kit, which is based on a Google AIY Voice Project kit, includes a "smart" speaker (a box of a Raspberry Pi laptop (as well as a tiny speaker and an instruction book). Users of the library can check out the kit and learn how to use the Python programming language to program the device to understand voice commands.

II. CONCLUSION

By implementing AI, libraries will be able to more easily assist both present and past patrons in their hour of need. Both developed and developing country libraries are still learning the full extent of this technology. Despite the large amount of AI literature available in libraries, the majority only address a small number of applications. Undoubtedly, AI is one of the cutting-edge applications that, when put into practice, maximize library services at a minimal cost. Libraries are essential facilitators of cutting-edge technology. It's important to consider allocating sufficient funds for integrating AI into library operations. This has demonstrated how AI applications save money and time in practically every area of society. The use of AI in academic libraries has been growing at an extremely rapid rate. There are additional obstacles and things to think about when implementing AI in libraries. Careful consideration of important factors such as privacy issues, ethical concerns, and the need to guarantee equitable access to information is imperative. Success in the domains of expert systems, natural language processing, robotics, and pattern recognition has sparked a lot of business activity and the creation of numerous businesses. Artificial intelligence seems to be becoming more and more useful in tasks like documentation, classification, collection development, and cataloguing. Ultimately, the creation of an effective expert system for technical services and information processing and management will have a significant positive impact on the field of library and information science.

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