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IMPACT OF ARTIFICIAL INTELLIGENCE (AI) APPLICATIONS ON ACADEMIC LIBRARIES

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Abstract *Artificial Intelligence (AI) is a science, which focuses on creating machines that engages on the behaviours performed by humans. The Artificial Intelligence discussion continues with knowledge based systems and various searching algorithms used in the development of AI System. The later part of the article explains with the natural language processing and importance of expert systems in future implications. The article concludes by providing a brief discussion of neural networks and AI Languages pattern recognition and robotics of applications in the libraries.*

Keywords: *Robotics, Artificial Intelligence, Natural Language Processing (NLP), Expert System*

INTRODUCTION

John Mc Carthy coined the term "Artificial Intelligence" in 1956 at the Massachusetts Institute of Technology (MIT). According to Mc Carthy AI is the science and engineering of making intelligent machines, especially intelligent computer program. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to biologically observable methods. In simple terms, AI is the branch of computer science devoted to developing a program that enables computers to display behavior that can broadly be characterized as intelligent. This chapter deals with the basic understanding of AI and some of the most important aspects such as expert system, natural language processing (NLP) neural networks and robotics.

What is Intelligence: AI as a branch of computer science that deals with the study and creation of computer system that exhibit some from of intelligence. Now the question arises what is intelligence. We can define intelligence as the ability to acquire, retrieve, and use knowledge in a meaningful way. It is includes both raw and refined knowledge and the ability to memorize not as a single ability or cognitive process but as an array of separate components. Research in AI has focused chiefly on the following components of intelligence.

- *Learning:* It is the process of acquiring knowledge skills experience or values by study experience or training.
- *Reasoning:* It refers to the identification of the significance interpretation or explanation for certain data or information. Simply put it is the ability to employ knowledge.
- *Understanding:* It refers to the identification of the significance interpretation or explanation for certain data or information. Simply put it is the ability to employ knowledge.
- *Creativity:* It is the ability to generate new ideas or to conceive a new perspective on existing ideas. The creativity process involves producing ideas, which are original and potentially useful.
- *Intuition:* It is the inner knowledge without rational process and without being aware of how we know. Especially intuition is an uncanny sixth sense that tells people whether they are right.

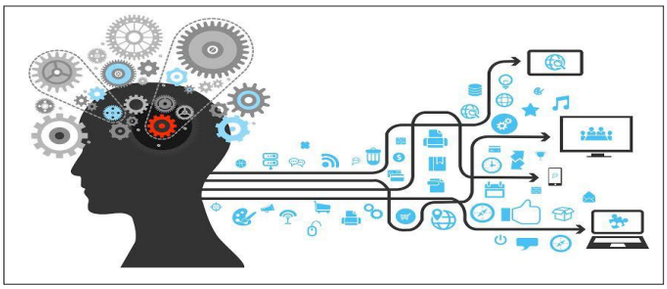

Fig. 1: Intelligence Fundamentals

Artificial Intelligence: The potential applications of AI are numerous. They extend from the military for autonomous control and target identification to the entertainment industry for computer games and robotic pets. It can also be applied in big establishments dealing with huge amounts of information such as hospitals, banks and insurances, which can use AI to predict customer behavior and detect trends.

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In each category a unique field in their own right but at the same time, all four categories share a common ground.

- *Thinking Humanly:* Thinking comes naturally to human beings and we term it as common sense. The discipline that deals with the basis physics of human intelligence is known as cognitive science. Cognitive Scientists try to construct theories of how the human mind works in the process a model of intelligent human behavior is created to simulate on a computer to determine.
- *Acting Humanity:* The system should pass the timing test which distinguishes intelligent entities from unintelligent ones.
- *Thinking Rationally:* Rational Behaviour means doing the right thing, which is expected to maximize goal achievement in available information.
- *Acting Reliability:* It may not necessary involve thinking but thinking should be in the service of rational action. Hence acting relationally and thinking humanly are complementary. Most AI researches in computer science go for acting rationally.

Domain Areas of Artificial Intelligence

Various domain areas where AI is currently being used includes.

- *Game Playing:* The greatest advancements in AI have been achieved in the field of game playing. For example computer chess programs are now capable of beating humans.
- *Speech Recognition:* Computer speech recognition has reached a practical level for limited purpose.
- *Understanding Natural Language:* Just getting a sequence of words into a computer is not enough and even Parsing sentences is not enough.
- *Computer Vision:* The world is composed of three-dimensional objectives but the inputs to the human eye and computer's cameras are two dimensional. Some useful programs can work solely in two dimensions, but full computer vision requires partial three-dimensional information.
- *Expert System:* Computers are programmed to made decisions in real-time situations for example some expert system help doctors diagnose disease based on patient's symptoms. One of the first expert system was MYCIN which diagnosed bacterial infections of the blood and suggested treatments. The system performed better than medical students or practicing doctors.
- *Heuristic Classification:* A heuristic is a way of trying to discover something or an idea embedded in a program. An example is advising whether to accept a proposed credit card purchase. Information available about the owner of the credit card, his record of payment, and also about the items he is buying about the establishment from which he is buying it.
- *Natural Networks:* Computers are programmed to simulate intelligence by attending to reproduce the types of physical connections that occur human brain. Neural computing systems mimic the brain through a network of highly interconnected processing elements, which give the learning capabilities and enable then to recognize and to understand subtle or complex patterns.
- *Robotics:* It ideas with programming computers to see here and to react to other sensory stimuli. In the area of robotics computers or now widely used in assembly plants, but they are capable of only limited talks. Robots have great difficulty identifying objects based on appearance or feel and they still move and handle objects clumsily.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN ACADEMIC LIBRARIES

Computers are providing the perfect medium of experimentation and the application of Artificial Intelligence technology in the current era. Artificial Intelligence has more success at intellectual tasks such as computer-based game playing and theorem proving than perceptual tasks. Sometimes these computer programs are intended to stimulate human behavior and they are built for technological applications also such as Computer-aided instruction. In many cases the main goal is to find any technique that does the task quick in the better way.

Expert System Applications on Library Activities

A recent application of AI is expert system, which began to emerge during 1070. These systems have proven effective for finding solutions to a large number of problems domains which earlier required the assistance of the human mind.

An expert system can be defined as an embodiment within a computer of knowledge-based components from an expert skill in such a form that the machine can offer intelligent advice or take an intelligent decision about a processing function. It is an AI application that users a knowledge base of human expertise to aid in solving problems. Library activities are related to the reading materials, users and staff.

This application of Expert Systems where dialogue between staff and users, users and database appears quite promising. The Expert System will help the librarian in realizing the need for an improvement in productivity. The well known programmed Expert System will also improve the quality.

Applications of Expert Systems in Reference Service

- Reference service is a main activity of any library and the Expert System will be work as a substitute for a reference librarian. Following are some of the examples of Expert Systems used for Reference Service.
- *Research:* A system that supplies patrons, the recommended sources to lookup for certain question. The system can be used to teach students reference skills or as a computerized aid for practicing reference librarians and information specialists.
- *Online Reference Assistance:* The system intended to stimulate the services of an academic reference librarian for questions of medium and low level, by using several technologies of videotext like database, computer-assisted instruction modules, and knowledge-based system.ORA consists of Directional transactions like library locations, services and polices.
- *Amswerman:* An Knowledge based system to help users for reference questions on agri topics. It uses series of menus to narrow down the subject of the questions and the type of tool needed. It can function as either a consultation system or as a front end to external databases and CD-ROM reference tools.
- *Pointer:* It was the early successful working application of computer system in the area of reference work. It directs the users to the reference sources; It is not a Knowledge-based system but a computer-assisted reference program.

Application of Expert System in Cataloguing

Cataloguing is one of the oldest library crafts. Recent attempts to automate cataloguing through Expert Systems have focused on descriptive cataloguing because it is considered rule-based (AACR2). There are two approaches for applying artificial intelligence techniques to cataloguing.

- A human-machine interface, where the intellect effort is divided between the intermediary and the support system.
- An Expert System with full cataloguing capability linked into electronic publishing system, so that as a text is generated on-line, it can be passed through knowledge-based systems and cataloguing process is done without any intellectual input from an intermediary. There have been problem in every attempt to convert AACR2 into the highly structured rules necessary to run the Expert System.

Application of Expert System in Classification

Classification is a fundamental activity of the organization for getting knowledge, for this reason, it is prominent in all systems for organizing knowledge in libraries and information centers. Application of Expert System in the area of classifications in libraries includes the following:

- *Coal SORT:* The conceptual browser designed to serve either as a search or an indexing tool. Coal SORT consists prime of a frame-based semantic network and the software needed to allow users to display portions of it and to move around in the conceptual structure. The expert knowledge in the system is embodied almost entirely in the semantic network. There is no procedural knowledge in the system.
- *EP-X:* The Environmental Pollution Expert (EP-X) has certain things in common with coal SORT in that both are concentrating on enhancing interface using a Knowledge Based approach. The knowledge base of EP-X consists of the hierarchical frame-based semantic network of concepts and a set of template that express the patterns called the pragmatic relationship among concepts. These patterns are referred to as conceptual information.
- *BIOSIS*: BIOSIS uses of knowledgebase including a significant amount of procedural knowledge to assign documents to categories automatically. It is designed as an indexer aid. BIOSIS uses the information in the titles of biological documents to assign as many categories as possible of those that would be assigned by human indexers. The indexing languages are structured and practical representation of information that can be used to very good advantage of Artificial Intelligence applications,

Application of Expert System in Indexing

The Indexing of periodicals is another area where expert systems are being developed. Indexing a periodical article involves identification of concepts to translate these concepts into verbal descriptions and selecting and assigning controlled vocabulary terms that are conceptually equivalent to verbal descriptions. The reason for automating the

intellectual aspects of indexing is to improve the indexing consistency and quality. Based on the information provided by the information provided by the indexer, the systems can arrive at appropriate preferred terms automatically to assign relevant subdivisions. The system can make inferences & based on the inference, it can take appropriate action. Med Index is the best example of indexing system used in the library Indexing activity.

Applications of Natural Language Processing on Library Activities

The term Natural Language Processing is first thought one might have is of being able to speak or write in a complete sentence and have a machine process the request and speak. NPL can be applied to many disciplines. To apply this to the field of Library and Information science and more specifically to searching database such as online public access catalogs (OPAC) Indexing is the basis for document retrieval.

Applications of Robotics in the Library Activities

Robot is An automatically controlled, reprogrammable, multi-purpose manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in automation applications. The robots are on scrambling, rolling, flying, and climbing. They are figuring out how to get here on their own. As libraries provide a growing array of digital library services and resources, they continue to acquire large quantities of printed materials. This combined pressure of providing electronic and print-based resources and services has led to severe space constraints for many libraries, especially academic research libraries. The goal of the Comprehensive Access to Printed Material (CAPM) is to build a robotic, on-demand and batch scanning system that will allow for real-time browsing of printed material through a web interface. The user will engage the CAPM system that, in turn, will initiate a robot that will retrieve the requested item. The robot will deliver this item to another robotic system that will open the item and turn the pages automatically. By using existing scanners, optical character recognition (OCR) software, & indexing software developed by the Digital Knowledge Centre, the CAPM system will not only allow for browsing of images of text, but also for searching and analyzing of full-text generated from the images.

Characteristics of Expert System: An expert system must exhibit the following set of characteristics.

- It should solve difficult programs in a domain as good as or better than human experts.
- It should possess vast qualities of domain-specific knowledge to the minutes details.
- It should permit the use of heuristics search process.
- It should be capable of accepting advice, modify, update and expand.
- It should process the capacity to cater the individual's desire.

Users in Expert Systems: Generally three individuals are involved in expert system there are

- *End-User:* The end-user is an individual who uses the system for problem-solving assistance.
- *Problem-Solving Expert:* This expert builds the knowledge base for system and is responsible for transforming the entire knowledge about the specific domain to the system.
- *Knowledge Engineer:* The knowledge engineer is concerned with assisting the representation chosen for the expert system. This engineer defines the inferences engine used to process of knowledge.

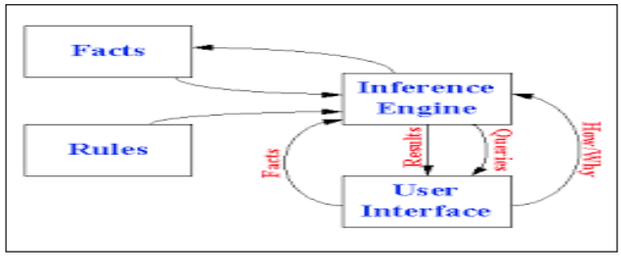

Fig. 2: Expert System Users

Advantages of Artificial Intelligence

- Can take on stressful and complex work that humans may struggle.
- Can complete task faster than a human can most likely.
- To discover unexplored things. i.e. outer space;
- Less errors and defects.
- More powerful and more useful computers.
- New and Improved Interfaces.
- Solving New Problems.
- Better handling of information.
- Conversation of Information into knowledge.
- Relieves Information overloaded.

Disadvantages of Artificial Intelligence

- Increased cost.
- Few experienced programmers.

- Lacks the "human touch".
- Has the ability to replace human jobs.
- Can malfunction and do the opposite of what they are programmed to do.
- Can be misused leading to mass-scale destruction.
- Difficulty with software development slow and expensive.

CONCLUSION

The applications of Artificial Intelligence have been deployed that demonstrated for the time-saving money to business sectors, Industrial sectors, military sectors, scientific sectors, academic and research organizations. Artificial Intelligence applications and their utilities will be increasing day by day in many Information Technology oriented educational Institutions which are contributing AI-related recorded information on its AI technology and its utilities in various areas / subject fields. The success in Expert systems of field Natural Language Processing field, Pattern Recognition field, Robotics field has precipitated substantial commercial activity, including the formation of many ventures. The practicability of artificial intelligence in the areas such as cataloguing, classification, documentation, collection development etc appears to be improving year after year. It is sure that in the near future artificial intelligence will occupy in all the spheres with the introduction of competent models with AI techniques. Library and Information Science will be greatly benefited by the development of the efficient through the expert system for technical services as well as Information processing in the academic library sector. The AI dramatically influenced people's lives and done wonders to help in the automation process of their activities in the libraries.

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