

Survey on Application of Artificial Intelligence Techniques

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Abstract— Artificial Intelligence is the part of computer science concerned with the study and creation of computer systems that exhibit some form of intelligence. Intelligence is the ability to learn about, to learn from, to understand about, and interact with one's environment. It is not to make any mistakes but quickly to understand how to make them good. So intelligence is the faculty of understanding. Basically AI tries to solve the complex problems in more human like fashion and in relatively very less time than any human takes. This paper focuses a survey on applications of artificial intelligence techniques.

Index Terms— Hybrid AI, Fuzzy logic, Artificial neural network, Genetic algorithm, Knowledge based system, Expert system, Intelligence system

I. INTRODUCTION

Artificial Intelligence (AI) is defined as intelligence exhibited by an artificial entity to solve complex problems which can achieve such as system is generally assumed to be a computer or machine [1]. It has identifiable roots in a number of older disciplines particularly: philosophy, logic, mathematics, computation, psychology, cognitive science, biology, neuroscience and evolution. By looking at each of these in turn, we can gain a better understanding of their role in AI. And how this underlying disciplines have developed to play the role.

The rest of this paper is organized as follows. Section II introduces basic paradigm of AI. In Section III, presents application areas of AI. Section IV illustrates short description of AI in different fields. The conclusion is presented in Section V.

II. Basic Paradigm of AI

The basic paradigms of AI are shown by Fig 1, Fig 2 and Fig 3. The first Fig indicates base disciplines of AI,

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second Fig indicates different techniques of AI and third Fig indicates knowledge processing of AI.

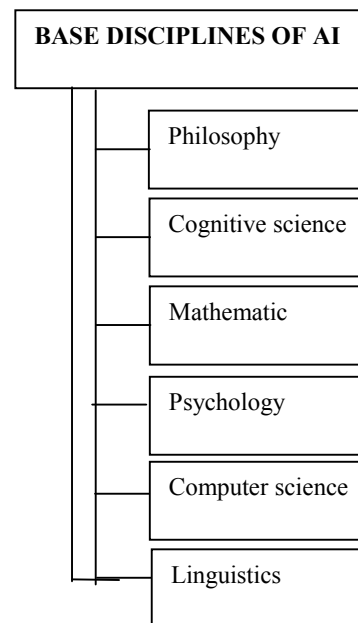


Fig. 1: Base Discipline of AI

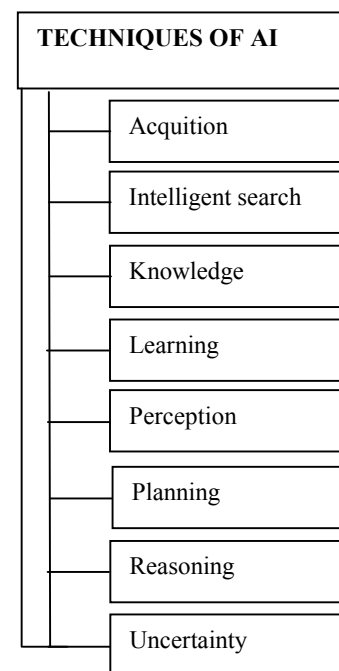


Fig 2: Techniques of AI

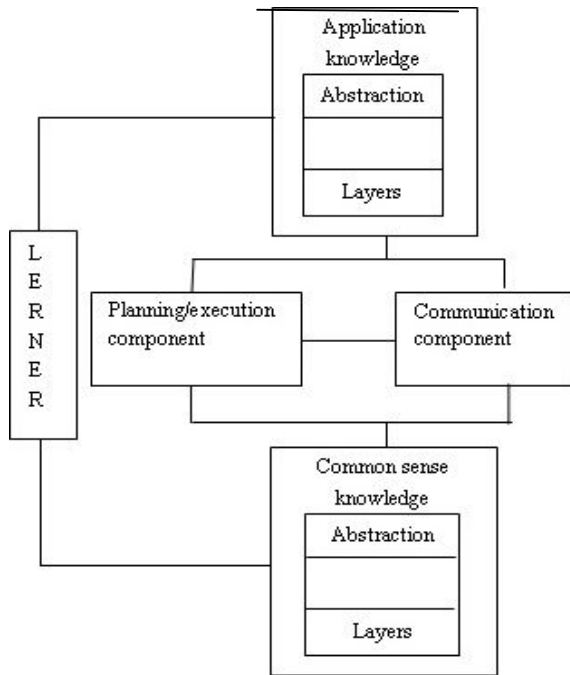


Fig 3: Knowledge processing of AI

III. APPLICATION AREAS OF AI

AI has become one of promising that can provide practice and reasonable solution. In engineering, there are various disciplines such as civil, computer, chemical, communication, electrical, electronics, industrial, mechanical, metallurgy, mining and production engineering in which AI finds its wide and well accepted applications. We describe some of the areas or domains in each discipline where AI finds its scope in application for its algorithm, methods, tools and techniques. AI is used in different fields which are shown in the fig 4 [35].

3.1 Agriculture

Producers and traders of agro goods are main benefactors of expert systems applications in agriculture. And expert system assist farmers to produce crops troubleshoot the crops once it is on ground and when to harvest it. Commodity loading is a complex business, which requires the expertise in understanding the marketing pattern, production of the grain, and distribution profile of the same.

3.2 Civil Engineering

In civil engineering AI deal with expert system in design, and structural design or architectural design that need the contribution of experts in construction of any building, highway or bridge.

3.3 Electrical Engineering:

There are various areas of electrical engineering that require the knowledge-based system approach like power system, electrical machines control, and power electronics and drive control.

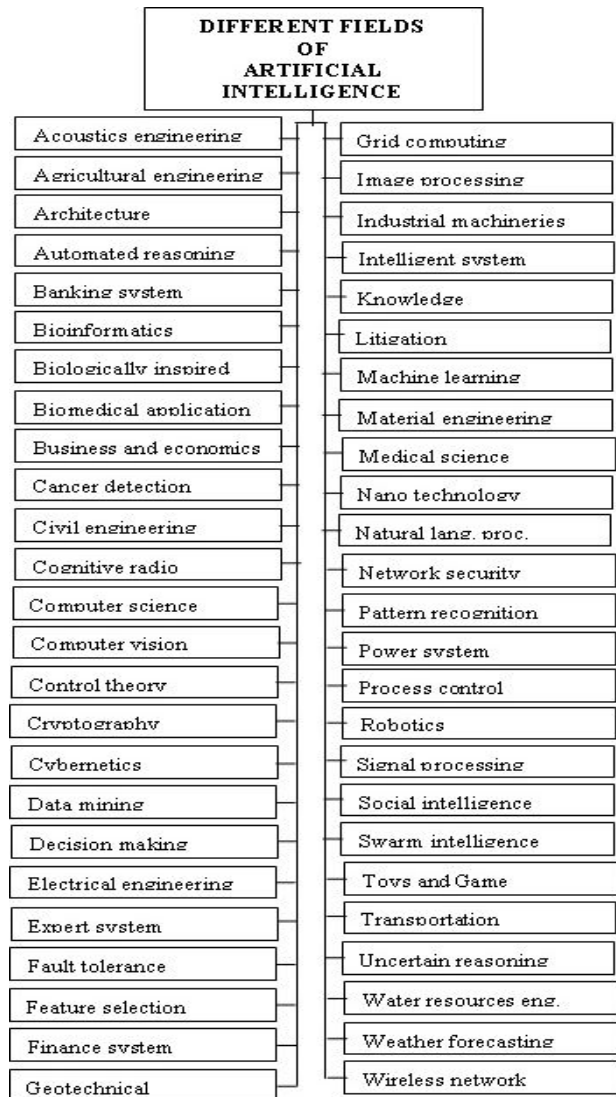


Fig 4: Different fields of AI

3.4 Computer Engineering

In computer engineering AI is integrated with the design of hardware –based system, their fault tolerant increased capacity, scheduling and load balancing of parallel computer multiprocessors. One of the emerging and broad areas of AI in computing is its integration into software engineering. The knowledge-base systems are being widely used in reusability, module verification, requirement analysis, functional design and program validation. The expert systems have been developed for determining the computer configuration according to the user’s requirement.

3.5 Industrial Automation and Manufacturing

Industrial Automation (IA) is concerned with introduction, incorporation and intervention of automation, starting from raw material handling, planning and production of items and their assembly leading to higher capable equipment and their inventory. Automation means less human interference, more computing with knowledge enriched

environment. Flexible manufacturing systems (FMS) have emerged to tie up with AI for industrial automation in most of the leading and pioneering industries in the world.

3.6 Management and Finance

In management and finance AI-based decision analysis is used. Basically it is an integration part of DSS and AI methodology which emerged as one of the powerful tools to solve the complex decision-making and decision-analysis problems which involve not only data analysis but also preferences, judgments, intuition on imprecise and inconsistent data.

3.7 Medical Computing

The impact of AI on hospital system can be seen in developing object-oriented model of different aspects of hospital system such as patient monitoring system, drug delivery system, hospital administration, ward management and clinical testing (pathological, microbiological, radiographic images).

3.8 Robotics

Robotics is one of the prime areas of AI applications. AI methodology is applicable to robotics in two ways: One is design and control of robot and the other is application of robots to various fields such as manufacturing, mining, medicine (surgery). Design and development of multi-robot working cooperation and coordination with the perception and pervasiveness like human (humanoid robot) is a very challenging problem for AI or knowledge-based system approach. Humanoid robots imitating many activities of human motor actions, as well as emotions, pose many challenging facts to AI community.

3.9 Short term load forecasting

An accurate and stable load forecast essential for many operating decision taken by utilities. A chip and reliable power system operation is the result of good short term load forecasting which provides the information is to be adopted in the online scheduling and security functions of the energy management system. An accurate load forecasting is essential for the optimal planning and large scale power system.

3.10 Transportation

Transportation system is basically concerned with scheduling and planning. Scheduling departures and maintenance involve manipulating the relationships between certain objects, namely vehicles, destinations, and service facilities. Addition and subtraction of selected change in routes are occasional but more attention is paid for maximizing the profitability of the current fleet serving current routes. There are different type expert system are used for these purpose.

3.11 Water resource management

It is a subarea of civil engineering that focuses on the use of water through proper management and control policy in colony, municipality, and industry. Above all, the resource is through river, canal and tanks, and reservoir. The utilization, storage and distribution of water needs a knowledge-based expert system to meet the requirement of different kinds of uses from rural (for irrigation) to urban (for drinking) having a large and complex network.

IV. SHORT DESCRIPTION OF AI IN DIFFERENT FIELDS

Sl.no.	Field of applications	AI Techniques	References
1	Aircraft and air traffic	NN, FL, EC	[2], [3]
2	Bioinformatics	FL, GA, EA, SI	[4]
3	Communication networks	FL, NN, EC	[5], [6], [7], [8]
4	Control and Monitoring	EC, FL, NN	[9], [10], [11], [12],[13],[14]
5	Data mining	KBS	[15]
6	Data security	ANN, FL	[16]
7	E-learning	Optimization	[17]
8	Fault detection	FL, GA, Hybrid AI	[18], [19]
9	Grid computing	FL, SI, KBS	[20]
10	Intelligent Systems	ANN, FL,	[21], [22]
11	Management and control of mitigation process and pollution	Expert system, FL, NN	[23]
12	Manufacturing technologies	FL, NN	[24], [25]
13	Mobile robots	FL, NN	[26]
14	Multi-Agent robots	EC, FL	[27]
15	Network optimization	GA	[28]
16	Multi-Agent robots	EC, FL	[27]
17	Network optimization	GA	[28]
18	Radio planning	ANN	[29]
19	Resource allocation	ANN	[30]
20	Resource allocation	ANN	[30]
21	Robotics	NLP, Intelligent	[31], [32]
22	Software engineering	Multi-agent AI	[33]
23	Waste water treatment	Hybrid AI, NN, Expert system	[34]

CONCLUSION

As the development of AI progresses in several fields computer scientists must be aware of their roles and brace themselves for the greater advancement of AI in the future. This paper has outlined different areas of AI. The successful applications of AI and the rapid growth suggest that the impact of AI will be felt increasingly in coming years. It encourages the integration of AI techniques into both every day and advanced applications.

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