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Expert System-A Review Article

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Abstract

One of the largest area of applications of artificial intelligence is in expert systems, or knowledge based systems as they are often known. This type of system seeks to exploit the specialised skills or information held by group of people on specific areas. It can be thought of as a computerised consulting service. It can also be called an information guidance system. Such systems are used for prospecting medical diagnosis or as educational aids. They are also used in engineering and manufacture in the control of robots where they inter-relate with vision systems.

In this paper Ihave discussed the number of researches carried out in the area of expert system. It also describes the future of expert system.

Keywords: Artificial Intelligence, Expert System, Rule-based system

Introduction

Expert systems are an offspring of the more general area of study known as artificial intelligence (AI). In the simplest sense, AI is the study of developing computer programs which exhibit human-like intelligence. Early AI researchers focused on such problems as game theory, robotic control, and vision systems. Common to each of these problems was research into ways of representing and reasoning with knowledge, in a computer, in a fashion similar to humans. The early studies in AI provided the insight needed to develop expert systems. In particular, these studies showed that reasoning alone is not a sufficient measurement of intelligent behaviour, but rather, one had to have a rich set of knowledge with which to reason. It was also determined that the problem needed to be well-focused, using only the knowledge relevant to a specific problem. These two requirements led AI researchers to use human experts for their source of problem-solving knowledge. By virtue of being an expert, the human possesses unique talents, made possible by the human's knowledge and problem solving skills on a particular subject. Because of the nature of these intelligent computer programs, they were aptly called expert systems. An expert system is a computer program designed to model the problem-solving ability of a human expert. The program models the following characteristics of the human expert:

-Knowledge
-Reasoning
-Conclusions
-Explanations

The expert system models the knowledge of the human expert, both in terms of content and structure. Reasoning is modelled by using procedures and control structures which process the knowledge in a manner similar to the expert. Conclusions given by the system must be consistent with the findings of the human expert. The expert system also provides explanations similar to the human expert. The system can explain "why" various questions are being asked, and "how" a given was obtained. One of the principal attractions of expert systems is that they enable computers to assist humans in many fields. These systems are **rule-based systems** are used as a way to store and manipulate knowledge to interpret .A rule consists of two parts: condition (antecedent) part and conclusion (action, consequent) part, i.e:

IF (conditions) THEN (actions)

Antecedent part of the rule describes the facts or conditions that must exist for the rule to fire. Consequent describes the facts that will be established, or the action that will be taken or conclusion that will be made. Information in a useful way. They are often used in artificial intelligence applications and research.
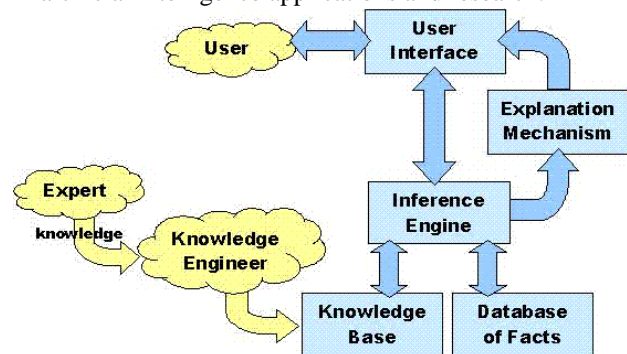
Fig.Expert system Architecture

Conventional Programs Versus Expert Systems

- Use a heuristic search [implicit steps] rather than an algorithmic search [explicit steps] – this speeds up the process of finding a "good enough solution" when an exhaustive search is impractical
  - *Satisfactory answers are usually acceptable,*
  - *Some incorrect answers are tolerable*
- Perform knowledge and decision reasoning tasks vs. performing programmed step-by-step procedures
- Employ a Knowledge-base vs. a Simple database
  - *Uses stored knowledge information for conclusions vs. only providing discrete facts about a subject*
- Separate the control structure from the domain knowledge (information) so when format/structures change, processing continues without complications or interruptions
- Encode expertise in data structures [inference rules] vs. encoding expertise in both the program and data structures so rules can be modified without rebuilding the program
- Simplify the modifications and expand the rule sets
  - *Rules are easier for (non-programmer) experts to create and modify vs. writing program code*

Literature Review

Recently, many research projects are dealing with Artificial Intelligence and Expert system area.
According to K S R Anjaneyulu(Research Scientist in the Knowledge Based Computer Systems Group at NCST.)

'A large number of expert systems are in real use and quite a few even being sold for individual use. In the future one is likely to see more expert systems packaged with domain knowledge being sold. Further, these systems are also likely to carry out specialized tasks as parts of much larger software systems.'

The development methodology of an expert system has two aspects: Knowledge engineering, and Software engineering. From the knowledge engineering aspect, he adopted the CommonKADS methodology, and model driven approach has been applied.

Stewart S. Karlinsky and Daniel E. O'Leary(Califonia)says Expert systems research recently has focused on the importance of theory-based "first principles." The term first principles refers to understanding the structure and function of problem solving. To date, research in tax-based expert systems has focused on developing prototypes of observed empirical relationships or models of the tax law. They focuses on applying first principles to expert systems in taxation based on an expert systems paradigm. Those first principles are used to elicit some of the major research issues faced in developing expert systems in taxation.

Edward-I-iShortlifficand Larvrcncc M. Pagan(Stanford University, Stanford) discusses expert system in terms of Modeling the Medical Decision Making Process. During the quarter century since the birth of the branch of computer science known as artificial intelligence (AI), rnuch of the research has focused on developing symbolic models of human inference. In the last decade several related AI research themes have come together to form what is now known as "expert systems research."' They review AI and expert systems to acquaint the reader with the field and to suggest ways in which this research will eventually be applied to advanced medical monitoring.

Jang-Jae Lee, Byuong-Ho Song, Tae-Yeun Kim, Dae-WoongSeo, Sang-Hyun (South Korea) designed Ubiquitous Health(U-Health) system which focuses on automated applications that can provide healthcare to citizen anywhere/anytime using wired and wireless mobile technologies is becoming increasingly important. This system consists of a network system to collect data and a sensor module which measures pulse, blood pressure and so on. In this paper, we propose an expert system using back-propagation to support the diagnosis of citizens in U-Health system.

U-Health system is composed of Bio Sensor Device, Bio-DB Server, Standard-DB Server and Expert System. U-Health system is inserted in the human body or wear a variety of possible biosensor signals through the human signal for a variety of real-time or periodic checks will be implemented automatically or manually. The human signal will be passed that to the system server that by using the Internet or wireless communication, regardless of time and space, through real-time communication network system. All data is passed to the results of an expert system to automatically real-time analysis of the materials inside to clean up problems that require a doctor's diagnosis in the final will be reported to a doctor. U-Health system is configured that to the new life you need to accurately monitor the development of a bio-sensor technology, measured bio-signals accurately in real time can be passed to medical institutions of networking technology, many of data to store, analyze the data processing and standardized systems and medical services provided to patients is composed of specialized medical services by using these materials. In this time the world's population being of the aging population to treat diseases of the human aspects

of the disease than to minimize the possibility of extending life and health care for the senior population is an important element of health. Accordingly, concept of the ubiquitous home health care treatment such as the health care phone is accelerating the development of remote medical services medical services.

Nana Yaw Asabere (School of Software, DUT, P.R. China / Lecturer, Computer Science Dept. Accra Polytechnic, Ghana)proposed a Mobile Medical Expert System (mMES) that can be used to solve problems of too many patients seeking daily medical attention in Ghana. This research showed that some of these patients need not attend a major referral Hospital such as Korle Bu Teaching Hospital in Ghana, which is the largest referral Hospital in Ghana and the third in Africa, because their sicknesses are minor and may not require hospital attendance. The proposed system when implemented will not only reduce patient numbers but also help Medical Doctors to speed up diagnosis and treatment of patients through the advice and interaction with a mMES.He recommends that Korle Bu Teaching Hospital and all other public and private Hospitals in Ghana should develop Mobile Medical Expert Systems to help and advice patients with medical treatments and Medical Doctor's in their daily medical tasks.

Expert Systems in Future

Computer power has increased exponentially since the 1960s and with every increase in power A.I. programs have been able to tackle new problems using old methods with great success. A.I. has contributed to the state of the art in many areas, for example speech recognition, machine translation and robotics.

AI are like children that need to be taught to be kind, well mannered, and intelligent. If they are to make important decisions, they should be wise. We as citizens need to make sure AI programmers are keeping things on the level. We should be sure they are doing the job correctly, so that no future accidents occur**.**

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