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ARTIFICIAL INTELLIGENCE APPROACH FROM RESEARCH TO APPLICATION IN MODERN TECHNOLOGY APPLIED IN UNDERGROUND MINES

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Abstract:

Artificial Intelligence is the modern technology which is mostly applied in the every field of science to make a system more intelligent as like as human thinking. It provide a great contribution to modern science, such as knowledge systems and machine learning [2]. It provides a way to transform the technology from science to real-world applications. Decades of AI research precede a rather short but significant period, in which companies report the useful exploitation of AI technology [7]. This paper illustrates the role played by science, and it argues that AI is just beginning to produce an ever increasingly variety of real world applications. No doubt it also help to design intelligent robots with the help of which we can have a safer underground mining.

Key Words: Artificial Intelligence, General; Applications and Expert Systems; Machine Learning, Coal Mines, Underground Mines.

1. INTRODUCTION

As we know that it is the technique which is mostly applied to make a system intelligent, hence if we take a review over the last 30 years, Research on Artificial Intelligence (AI) has produced a rich variety of techniques for the acquisition, representation and processing of knowledge [5, 6].

The AI technique has a variety of application in modern science like expert system and fuzzy logic. In the early years, research on AI was centered around human intelligence, in particular reasoning and cognition. But today, AI has become a rather broad field, as we have discussed above. AI are predominantly concerned with building smart computer systems that can recognize speech, can see, can predict the stock market, can drive robots, miners which applied in underground mines for safest mining and so on[2].

The main goal of this paper is to review some of the recent advances in AI, and their applications to real-world problems. In particular, this paper describes recent work on knowledge systems and machine learning, two major areas which were picked as representative examples for AI technology.

2. PROCESSING KNOWLEDGE IN COMPUTERS:

KNOWLEDGE SYSTEMS

2.1 A BRIEF HISTORY

As we know that, A Computer is an electronic device which works under the stored programs. It means a computer can respond to us accordingly as we like to do. But have we ever thought how? Yes it is a set of decision making instruction held in logical manners which

instruct a processor what to do? This is nothing but the intelligence [7]. No doubt a human has to give the instruction but ultimately the system has to process the task.

For example, we take the BUT system, which is a knowledge system developed at the University of Bonn. We use this and other examples to elucidate the role of research in the development of AI technology, and it's increasing impact on consumer products and industry.

If we take the case of knowledge systems, we can say that knowledge is nothing but the decision taking capability. So how a system can easily take a decision within the small time span as soon as we give the instruction. The general research goal was to create computer programs with the power of general problem solvers [17, 16, 8]. It quickly become apparent, however, that The development of such general-purpose programs was infeasible, as research projects lacked the expected results. Consequently, the research begun to focus on rather specific and narrow application areas, in which knowledge systems were remarkably successful.

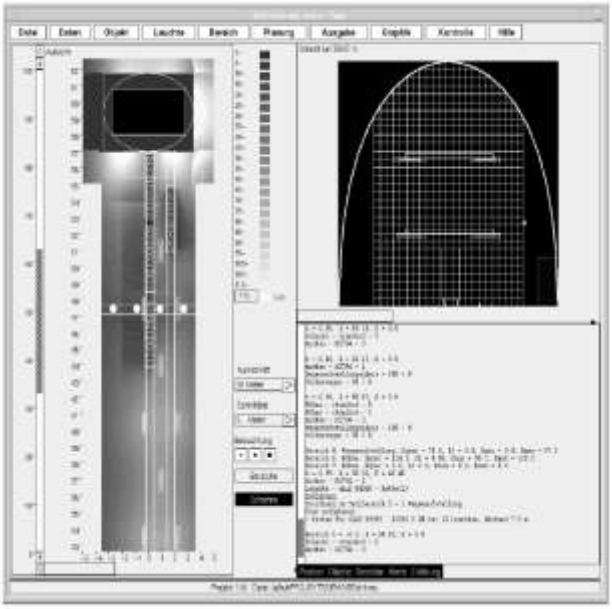

Figure 1. Output generated by the BUT system. Left side: Illumination plan generated by BUT. Right side: Front view of a shaft in a mine.

Significant milestones of early knowledge systems research include applications to medical diagnosis [20], chemistry [4], and the design of computer systems [17]. These and other applications are surveyed in [8,12]. The development of dedicated problems solving procedures for different tasks, such as specialized knowledge representation schemes or inference techniques, led to an exhaustive tool-box which facilitates the integration of knowledge intense problem solving methods into conventional software systems..

2.2 BUT: A REAL WORLD APPLICATION

A BUT is a real time system which is also known as "**Beleuchtung unter Tage**", is a popular knowledge system that optimizes underground illumination in hard-coal mines. As we know that the coal mine area are very sensitive and darken where we can't put lamps or any illuminated object which may cause any sort of risk factor which may lead a accident in the mine for miners [13]. The coal mines contain the various gases and flammable things which may catch fire during the mishandling of the operation. Hence, this system was developed in the context of a cooperative research project between the Ruhrkohle AG, Essen and the University of Bonn [19]. The goal of this project was the creation of an intelligent assistant for the cost-optimal layout of light sources in hard-coal mines.

By using the BUT system, we solve the following problem which is a important aspect in the coal mine. The points are as below:

1. Given a particular mine layout, which includes size of the mine its area as well as its inner configuration.

2. Description of all installed objects and equipment therein,
3. Identify the tasks to be performed by the miners.

Subsequently, determine which light intensities are required in different areas of the mine. The initial situation, when starting the BUT project, was prototypical for many applications of knowledge systems in industry [19]. Research, carried out by the industrial partner, provided the domain-specific problem solving knowledge, such as heuristics for the derivation of working areas, good mounting places, and a domain-specific approach for computing light intensities.

The BUT system, which is the result of this cooperation, integrates both the application-specific knowledge by the industrial partner, and the algorithmic and representational structures provided, ultimately, by the science of AI [20,17].

3.MACHINE LEARNING, NEURAL NETWORKS, AND THEIR APPLICATION TO THE REALWORLD

3.1. WHY LEARNING?

A second important example for the successful transfer of AI technology to the industry is the field of machine learning. Machine learning is a strongly interdisciplinary field. Aw we know that now a day we are fully dependent on machine for our daily works whether it's personal or official. Some scientists seek an understanding of how learning in biological systems works, and what role, if any, it plays in intelligence and cognition[15]. Others are more concerned with building advanced systems that can robustly accomplish complex tasks in hard-to-model and potentially time-varying environments

The ultimate goal of machine learning is to build computers that can program themselves. Given a performance goal, specified by the user, the computer shall have the ability to gather knowledge through experimentation, such that it will eventually improve in performance. In order to do so, the computer is equipped with sensors, which allow it to query information about its environment (like a camera on a robot, or a keyboard on a computer)[11, 9]. It is also equipped with effectors, which allow it to act and to influence its environment. To date, machine learning comprises a broad family of approaches that basically can generalize from observations. Unsupervised learning techniques, on the one hand, aim to find statistical regularities that characterize complex probability distributions. On the other hand, supervised learning techniques seek to fit unknown functions based on input-output examples.

4. FROM WETWARE TO SOFTWARE: NEURAL NETWORKS

Many of to date's successful real-world applications of machine learning technology can be found in the field of artificial neural networks. To make a machine intelligent we have to use the AI technique as a major constraint. Artificial neural networks, in rough analogy to the human brain, consist of a collection of simple and densely interconnected processing units, which process information in a massively parallel manner. This abstract description, in fact, fits what can be found in the brain, although none of the current approaches is powerful enough to account for the phenomenon of intelligence. The long way of academic research to successful real-world application is best illustrated by elucidating the history of artificial neural network research. The roots of formal neural network models can be traced back to early work by McCulloch and Pitts [16]

and Hebb [9] in the 40's, who established first models of neural processing and plasticity. Minsky [18], in the late 60's, showed some of the limitations of the early methods, which had quite a discouraging effect on the field. But if we consider today's scenario, then the field of artificial neural network research covers a rather broad and interdisciplinary field, with roots in computer science, physics, psychology, philosophy, biology, and others.

Artificial neural network is a vast research area which is applied in the most places of research and has led to a more profound understanding of learning, both in the human brain and in technical systems, along with a variety of learning methods and applications. The importance of AI with Nural Network played a vital role in most of the algorithm, which has been employed in the vast majority of applications of neural network technology in industry. We may take the case of **Back Propagation algorithm** [4, 14, 5]. The term back propagation was originally introduced in 1986. Since then, a drastically increasing number of researchers has used this and related neural network learning algorithm for fitting functions of arbitrary types. The idea of this learning algorithm is simple enough to be sketched in this paper.

Back propagation networks realize mathematical functions that map a multidimensional input space to a multidimensional output space. Inside these networks, each processing unit receives values from other processing units.

5. CONCLUSION

As we know that, Artificial Intelligence is the modern technology which is mostly applied in the every field of science to make a system more intelligent as like as human thinking. It provide a great contribution to modern science, such as knowledge systems and machine learning.

In the last years, AI technology has been applied to a variety of real-world problems. In this paper we have outlined some examples from knowledge systems and machine learning/neural networks, along with some recent applications to industry, business and science. Due to lack of space we cannot here expound on other, relevant research areas that also have produced impressive real-world results, such as robotics, vision, speech technology, and evolutionary programming. Indeed, successful ideas and applications that grew out of AI are, once established, often not explicitly recognized as AI technology. The true number of AI applications is unclear, as many companies, like financial forecasting companies or the military, do not publish their techniques and results.

In virtually all successful parts of AI, independent scientific work carried out at research institutions preceded the industrial applications. Most of these applications have emerged in the last five to ten years only, based at research that has being carried out at universities and academic institutions for more than 30 years. In recent years AI has undergone a change. Partially based on funding policies of government agencies and industry, partially due to the maturing field, and partially since today's hardware has grown powerful enough, practical applications have gained in importance. Many of today's applications, however, would have been impossible without the decades of fundamental research carried out mainly at universities and academic institutions.

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