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# Analysis expert system

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**Анотація**

В ході проведених досліджень було виявлено актуальність експертних систем, досліджено рівень їх можливостей та рівень користі їх для людства. Зроблено аналіз структурної області експертних систем. Досліджено можливості надання максимальної користі людям.

**Ключові слова:** експертні системи, бази знань, логічний висновок, користувач.

**Abstract**

In the course of the research it was discovered the relevance of expert systems, explored the level of their capabilities and level of benefit to humanity. The analysis of the structural area of expert systems. Possibilities to provide maximum benefit to people.

**Keywords:** expert systems, knowledge base, inference engine, user.

## Introduction

Expert Systems are computer programs that derived from a branch of computer science research called Artificial Intelligence (AI). AI's scientific goal is to understand intelligence by building computer programs that exhibit intelligent behavior. It is concerned with the concepts and methods of symbolic inference, or reasoning by a computer, and how the knowledge used to make those inferences will be represents inside the machine [1]. Expert systems (ES) are one of the prominent research domains of AI. It was introducing by the researchers at Stanford University, Computer Science Department. The expert systems are the computer applications developed to solve complex problems in a particular domain, at the level of extra-ordinary human intelligence and expertise.

Often, the term expert systems is reserved for programs whose knowledge base contains the knowledge used by human experts, in contrast to knowledge gathered from textbooks or non-experts. More often than not, the two terms, expert systems (ES) and knowledge-based systems (KBS), are used synonymously. Taken together, they represent the most widespread type of AI application. The area of human intellectual endeavor to be capture in an expert system is call the task domain. Task refers to some goal-oriented, problem-solving activity [2].

Building an expert system as known as knowledge engineering and its practitioners are calling knowledge engineers. The knowledge engineer must make sure that the computer has all the knowledge needed to solve a problem. The knowledge engineer must choose one or more forms in which to represent the required knowledge as symbol patterns in the memory of the computer -- that is, he (or she) must choose a knowledge representation. He must also ensure that the computer can use the knowledge efficiently by selecting from a handful of reasoning methods.

## The Building Blocks of Expert Systems

Every expert system consists of two principal parts: the knowledge base; and the reasoning, or inference, engine. Knowledge Base contains domain-specific and high-quality knowledge. Knowledge is required to exhibit intelligence. The success of any ES majorly depends upon the collection of highly accurate and precise knowledge. Use of efficient procedures and rules by the Inference Engine is essential in deducting a correct, flawless solution. In case of knowledge-based ES, the Inference Engine acquires and manipulates the knowledge from the knowledge base to arrive at a particular solution. Building expert systems is generally an iterative process. The components and their interaction will be refined over the course of numerous meetings of the knowledge engineer with the experts and users. We shall look in turn at the various components [2, 3].
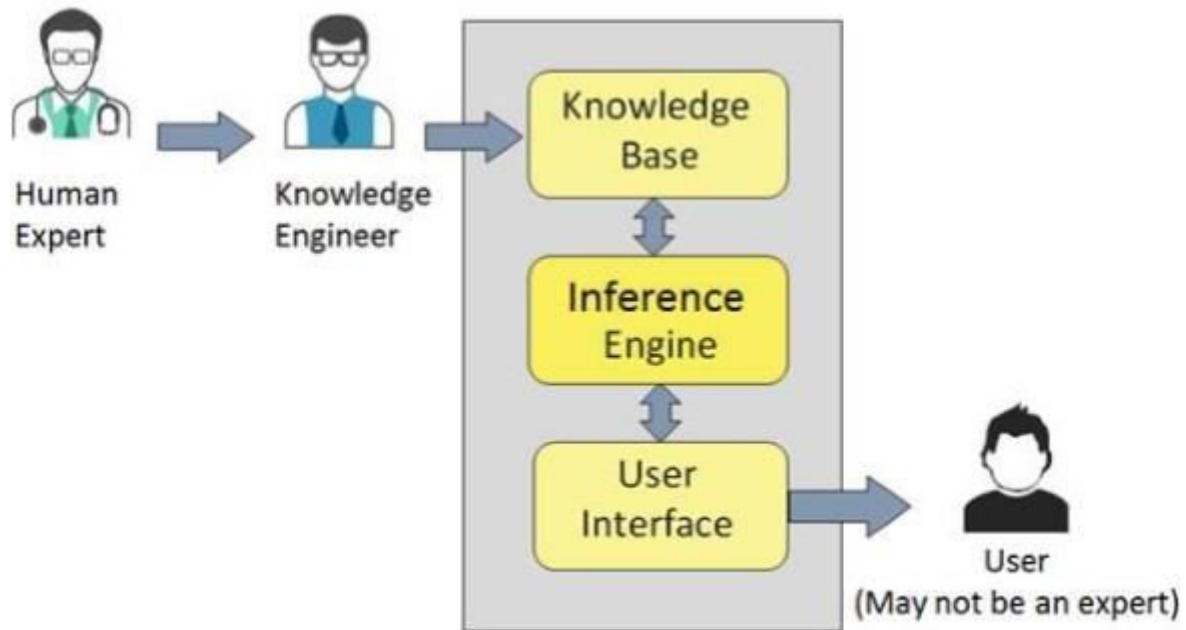
**Capabilities of Expert Systems**

The expert systems are capable of −
- Advising
- Instructing and assisting human in decision making
- Demonstrating
- Deriving a solution
- Diagnosing
- Explaining
- Interpreting input
- Predicting results
- Justifying the conclusion
- Suggesting alternative options to a problem

They are incapable of −
- Substituting human decision makers
- Possessing human capabilities
- Producing accurate output for inadequate knowledge base
- Refining their own knowledge [4]

**Applications of Expert System**

The spectrum of applications of expert systems technology to industrial and commercial problems is so wide as to defy easy characterization. The applications find their way into most areas of knowledge work. They are as varied as helping salespersons sell modular factory-built homes to helping NASA plan the maintenance of a space shuttle in preparation for its next flight. Applications tend to cluster into seven major classes [6].

Diagnosis and Troubleshooting of Devices and Systems of All Kinds. This class comprises systems that deduce faults and suggest corrective actions for a malfunctioning device or process. Medical

diagnosis was one of the first knowledge areas to which ES technology was applied (for example, see Shortlife 1976), but diagnosis of engineered systems quickly surpassed medical diagnosis. There are probably more diagnostic applications of ES than any other type. The diagnostic problem can be state in the abstract: given the evidence presenting itself, what is the underlying problem/reason/cause [1].

Planning and Scheduling. Systems that fall into this class analyze a set of one or more potentially complex and interacting goals in order to determine a set of actions to achieve those goals, and/or provide a detailed temporal ordering of those actions, taking into account personnel, materiel, and other constraints. This class has great commercial potential, which has been recognizing. Examples involve airline scheduling of flights, personnel, and gates; manufacturing job-shop scheduling; and manufacturing process planning.

Configuration of Manufactured Objects from Subassemblies. Configuration, whereby a solution to a problem is synthesizing from a given set of elements related by a set of constraints, is historically one of the most important of expert system applications. Configuration applications were pioneering by computer companies as a means of facilitating the manufacture of semi-custom minicomputers (McDermott 1981). The technique has found its way into use in many different industries, for example, modular home building, manufacturing, and other problems involving complex engineering design and manufacturing [9].

Financial Decision Making. The financial services industry has been a vigorous user of expert system techniques. Advisory programs have been creating to assist bankers in determining whether to make loans to businesses and individuals. Insurance companies have used expert systems to assess the risk presented by the customer and to determine a price for the insurance. A typical application in the financial markets is in foreign exchange trading [9].

Knowledge Publishing. This is a relatively new, but also potentially explosive area. The primary function of the expert system is to deliver knowledge that is relevant to the user's problem, in the context that the user's problem. The two most widely distributed expert systems in the world are in this category. The first is an advisor, which counsels a user on appropriate grammatical usage in a text. The second is a tax advisor that accompanies a tax preparation program and advises the user on tax strategy, tactics, and individual tax policy [9].

Process Monitoring and Control. Systems falling in this class analyze real-time data from physical devices with the goal of noticing anomalies, predicting trends, and controlling for both optimality and failure correction. Examples of real-time systems that actively monitor processes can be find in the steel making and oil refining industries.

Design and Manufacturing. These systems assist in the design of physical devices and processes, ranging from high-level conceptual design of abstract entities all the way to factory floor configuration of manufacturing processes [7, 8].

## Conclusion

We began by considering what exactly Expert Systems are, their general architectures, and some of the typical tasks that they can deal with**.** We have considered all the possibilities of expert systems. Explored the field of use. I can conclude that these systems have great potential for development. They can simplify the rights in many areas and provide advice in any field.

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