THE EXPERT SYSTEMS – INSTRUMENT FOR OBTAINING ACCEPTABLE SOLUTIONS IN BUSINESS

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The attention of economists, managers and other professions is retained by a newly emerged domain, called artificial intelligence. The systems based on knowledge, the expert systems, the systems based on genetic algorithms, the fuzzy systems, the hybrid systems and the neuronal systems are systems of artificial intelligence which are on their way to occupy a more and more important place in the professional life. The expert systems constitute one of the most important areas of the artificial intelligence.

Introduction

In the Romanian scientific literature there are some works which offer a great number of pertinent information in the expert systems domain – a particular category of intelligent systems with a great sphere of applications in management, accounting, finance-banks, insurances etc.

P.G. Pigford and G. Baur show that "the expert system is a program product which emulate the human experts' behaviour who solve problems from the real world, associated to a particular domain of the knowledge"[5].

The expert systems (ES) are systems of programs based on the artificial intelligence techniques (IA), which register the human experts' knowledge in a well defined domain and then they use them for solving the problems from this domain.

In a detailed analysis of the expert systems we can identify the following [9]:

- from a conceptual point of view, the expert systems aim to reconstitute the human reasoning on the basis of the examinations obtained from the experts
- The expert systems dispose of knowledge and of the capacity of carrying on human intellectual activities
- They dispose of methods of investigating the knowledge and the expressing of the expertise, behaving like an "intelligent system"
- they are able to memorize the knowledge, to establish links between knowledge and to infer conclusions, solutions, recommendations, advices on the basis of the facts and of the processing of uncertain knowledge
- As for the level of informational realization, the expert systems are based on the principle of separating the knowledge (knowledge basis) of the program which treats it (inference engine).

In all the cases, the researchers agree on the fact that under the title of expert systems there are the programs of artificial intelligence or machines based on the high level knowledge, comparable with those of the more competent specialists from an applicative domain and in which these programs can realise performances of thought and intuition similar to the human experts.

Methods of research

The central element of the intelligent processing is constituted by the artificial reasoning, able to imitate the human reasoning. The expert systems reproduce the human experts' reasoning on the knowledge put at their disposal in a certain manner, possibly multiply this knowledge and explain their own lines of reasoning.

However we may call them, cognitive or intelligent systems, the expert systems constitute a domain of the artificial intelligence technology and many applications have already become remarkable. The expert systems, the expert systems generators and even the neuronal systems generators are already available on the market and contribute to the full to modelling the enterprise of the future.

So the expert systems are a modern instrument in the businessmen' hands for obtaining acceptable solutions, which bring profit to the problems with which they confront daily.

From the implemented expert systems, over 60% are business oriented for enterprises and their administration, and the rest cover the utilitarian, medical and educative domains.

The expert systems integrated in the multimedia applications constitute the most spectacular realization for businesses because they allow the watching of videoconferences from the specialized networks, very useful for managers who can address to their subordinates, they can evaluate their answers, following their mimic with the aim to establish the most adequate persons for certain tasks.

The industrial expert systems can offer process diagnostic services for maintaining and repairing the robotized production lines or just-in-time instructions for the security and safety of the industrial installations.

The business administration is a very important domain for the expert systems, because the policies, the procedures and the techniques used in tackling the current matters are favoured by these intelligent instruments.

For the accounting, as well as for the administration domain in general, the expert systems present interest due to the performances in processing the knowledge – data and information – especially in quality, correctness and efficiency, better accomplishing its objectives. There are already viable implementations in the managerial accounting as well as in the financial accounting.

The financial-banking domain is, at present, the best covered with expert systems in exploiting for placing the credits, administrating the portfolios, detecting the frauds, planning the taxes, the financial diagnosis, the banking planning.

The insurance and investment companies already use expert systems with the aim to improve the services compared to the concurrent companies.

The management domain is the most receptive and the best equipped with expert systems in current usage, because all the technological, economic and social conditions necessary to their introduction were already created.

The expert systems develop with the help of an information technology which follows main objectives as well as derived objectives. Among the main objectives we can enumerate [3]:

- The easy acquisition of the knowledge by expressing as directly as possible the expertise obtained by the human experts
- The efficient exploiting of the knowledge collection through: combining and linking the knowledge for inferring new knowledge by judgements, plans, demonstrations, decisions and predictions; considering the manner in which new knowledge is inferred
- The easy support of the whole game of operations on the knowledge (their adding, modification and elimination).

From the derived objectives we can mention:
- reducing the risks
- increasing the productivity
- learning.

The expert systems do not act independently of the other components of the exterior environment in which it is installed. It can be appealed by other external programs or it can send results by other programs. The majority of expert systems are interactive in the sense that their interface offers means of communicating with the human users, ensures the obtaining of data and information from the special sensors, from systems of administrating the database, from systems of tabular calculation or even from the program which administrates the classic files. The expert systems can also create and update databases, can imprint reports or can control the most diverse devices and instruments.

The development of the interface and of the integration with their action environment is not the same for all the expert systems. That's because we need different interfaces according to the inputs and the outputs necessary to the environment in which they operate.

The main characteristic of an expert system is to dispose of expertise, which is in fact the ability to execute at least at the level of the human expert a well determined work. This includes not only the capacity to solve a problem, but also to make this in a time as short as possible (shorter than the human expert would do it). The expertise means at the same time that the thesaurus of knowledge about the domain of the problem which is owed by the expert system has to be all-embracing and profound. Comprising the knowledge refers to the competence which it has to owe in the domain. An expert in a certain domain has always a great competence as regards its knowledge compared to a beginner in this domain. The past experience is probably an important factor which contributes to the increase of the competence.

In the case of the economic agents the expert systems, as intelligent systems, present the following attributes:
- the ability to assist experts to the projection of their own expert systems, and the users to the developing of the specific activities
- the ability to render sensitive the management on changing the operations and the relationships between the functions of the different departments
- the auto-organization and the restructuration of the knowledge base by the automatic activation in the conditions of the critical factors and the generation of signals on the operations provoked by changes in the direction of the re-equilibration
- the integration between the system of collecting the data with the operational modules and procedures with intelligent specific for the economical-financial analysis and the audit activities.

All the characteristics make from the technology of the expert systems a new source of increasing the productivity due to the fact that it is able to offer security and the necessary experience with their intelligent usage in making the decisions.

Table no. 1. The comparison between the human expert and the expert system

The factor	The human expert	The expert system
Time	Working days	Any time
Localization	Local	Anywhere
Information security	Irreplaceable	Replaceable
Perishableness	Yes	No
Performance	Variable	Permanent
Work speed	Variable	Rapid
Cost	Big	Acceptable

Undoubtedly, the experts are the most valuable resource of a company. They can offer creative ideas, they can solve difficult problems or they can execute in a very efficient manner routine activities. Their contribution can increase the productivity of the enterprise, in the sense of improving the competitive position on the market.

There are two reasons for which the construction of an expert system is decided, following the comparison of the table from above:

1. replacing an expert system
2. assisting an expert in his activity

The main reasons for replacing a human expert are:

- making the expertise available also after the schedule and in any of the point of work of the enterprise
- automatizing a routine task which needs an expert
- the expert retires or deceased
- the expert is very expensive
- the expertise needed in dangerous environments for the man's health or in periods of prolonged strike

The most actual opinion is that of P.C. Trealeven, who shows that the intelligent systems software has reached the maturity and it is represented by three categories:

- oriented on application (dedicated to a certain applicative domain)
- oriented on algorithm (it supports one or several important algorithms in the inference engines)
- with general task

The development environments oriented on application are destined to domains with economic specific or for administrating the enterprises, which the professionals can successfully use because they offer a large scale of possibilities; they have excellent interfaces with databases, with tabular calculation programs, with other external programs for statistic or for analysing the data.

The development environments oriented on algorithms support one or several algorithms, fact which offers a very good flexibility or easiness in their usage. The algorithms are offered in libraries of parameterized code, fact which allows the integration with the users' applications. The majority of algorithms are among those which are specific to the neuronal networks.

The environments with general task are mere kits which contain simulator libraries of algorithms, interfaces and other instruments of programming. They are destined to the experienced programmers and they are famous for the flexibility of the interfaces and of the control mechanisms. Some of them need even specialized equipment by the parallel computers type.

In all the cases, when we decide the usage of a developing environment must be carefully controlled and all the possibilities offered. So, we must have in view the following:

a) the hardware compatibility (for what type of station of labour it is available);
b) the software compatibility (for what operation systems it functions);
c) the inference engine characteristics (where we must take into account the allowed searches type, the control strategies type, the limits regarding the rules, strategies of solving the problems);
d) formalities used to the knowledge representation;
e) the knowledge administration (models of calculating the certitude factors);
f) mechanisms of applying the reasoning's;
g) the characteristics of the variables (types of variables: entire, real, range, number of variables);
h) possibilities of calculation with predefines functions;
i) number of commands and their power;
j) interferences of dialogue (easiness in usage, presence of menus, windows, icons);
k) helps to development (instruments of tracing, trouble-shooters', instruments of verifying the database coherence);
l) documentation and assistance ensured by the company.

Automatizing and improving the decisions is the natural vocation of the IT in general. When this processing aim to obtain information, advices and recommendations or notices, aiming even to improve the decisions, the expert

systems already constitute the most efficient solution. There are appreciations according to which 80% from a human expert's work can be automatized. We talk about the simple, repetitive, procedural operations, in which the expert system behaves like a normal computer, but also about the more complex operations, great consumers of time and energy, specific to the deductive, inductive or mixed reasoning's which the expert systems produce easily, rapidly and effectively. Foe example, the BEST system (Baking Expert System Tool) implies a certain expertise which is automatically made, gaining time in the most difficult cases of according the credits.

For example, an expert system is specialized in selecting a method of calculating the costs in direct correlation with the peculiarities of an economic agent.

The selection of the method will take into account the following peculiarities:
- the dimensions of the society;
- the process of production;
- the type of method (total or partial);
- the classification of expenses in fixed and variables, direct and indirect;
- the type of production;
- the determination of certain deviations from the standard;
- the domain of activity;
- the interest of the leadership in certain aspects.

The pieces of knowledge acquired from the experts will be taken over in the knowledge of the system with the help of a generator of expert systems. We will effectuate a correlated synthesis of the main characteristics specific to each calculation method. The generator used in this case in EXSYS Professional which allows the representation of the knowledge with the help of the rule production method.

After the transposition through program of all the conditions using the relationships IF…THEN the advices given by the expert system with the aim to choose the method of calculating the costs will be displayed.

Conclusions

But what the future has in store for us in the expert systems domain? In this sense we foresee the following directions of development:
- the massive developing of expert systems and neuronal systems generators, through which the experts themselves will be able to conceive new applications in the most different domains. The cognoticians will have them too an important role because they will concentrate less on the editions of developing the expert type applications and more on the applicative domains;
- the developing of some new methods, more performing of acquisition and representing the knowledge, which will become more and more available and accessible. This is the most interesting sector for the cognotician of the future;
- the most promising future belongs to the neuronal systems, which inspires from the structures of the human brain and the originality of which takes into account the distribution of the knowledge. The neuronal systems will not be dissociated by the expert systems, these ones implying one another.

We already have on the market generators of expert systems which use the description of objects, which make integrant part of the knowledge base, but these are only precursors because we will reach the intelligent systems which surpass many generators of expert current systems in the sense that the software integral in the neuronal systems will be available in a near future as hybrid instrument of conceiving the systems associate techniques oriented to the objects from the classic programming, fuzzy techniques.

In synthesis, if there is a modern and motivated management, when there are the possibilities of realising an operational expert system, and a team of experimented projectors, to which we add competent and motivated users, then the problem of realising an expert system becomes similar to that of realising an investment which must be conduced by inspiration and by the desire that the expert system which will be projected and useful for the economic operator.

In conclusion, an expert system can be created for simple problems, by little dimensions, as well as for complex problems. The problems of little dimensions solicit less the human expert, the construction of the knowledge base is made quickly enough. For the complex problems the human expert is solicited a greater period of time and for elaborating the knowledge base we need more time. From here we can get the idea of elaborating an expert system for problems of little and medium dimensions.

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