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The application of the artificial intelligence systems in the problem training: on the example of the program-diagnosing module of the expert training system

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The changing of the economic and social formations of society has set the task of revising of the structure and content of education as a whole. At the same time, the informatization (computerization) of society is gaining more and more scales. In these conditions the informatics and information technologies (IT) play the important role in the modern human culture and professional activity in particular. The modern specialist is inconceivable without the active proficiency in the methods and means of informatics and he can not be prepared without the systematic use of ECM in the learning process.

The informatization of education realizes the complex of measures, aimed on the improving of the level of preparation of the specialists by the way of expanding of the sphere of use of calculating technics and computer technologies in the learning and scientific-research work, in the management of the learning process, creates the additional possibilities for the stimulating of creative thinking at the students, increases the importance of their self-dependent work, simplifies the control and self-control, at the same time the increasing of the level of individual work of the teacher, changes the relationship between the intellectual and routine components in the learning work.

The computer technology of training – is a set of methods, forms and means of influencing on the person in the process of his development (training), with using of the means calculating technics. The training technology involves the use of the adequate ways of representation and assimilation of the various kinds of knowledge with helping of the modern computer technics.

The many-years researches in the area of artificial intelligence have made it possible to distinguish the self-dependent direction: expert systems (Expert Systems) or knowledge-based systems (Knowledge Based Systems) (knowledge engineering).

The expert training systems providing the achievement of pedagogical goals in the process of functioning on the basis of the bases of accumulated expert knowledge by the subject areas, play the significant role in the problem training, which allows to activate the cogitative activity of trainees, forces them to find the right decisions taking into account the set requirements and restrictions.

The building of the knowledge-based systems is based on the modeling of dialogue, consisting from the chain of question-answers structures and the subsequent analysis of the results of the examinee. The scientific-research work on the creation of intellectual systems based on knowledge revealed the general conception of building of the expert systems,- the fast prototype technology,- which regulates the parallelism of the processes of the accumulation of knowledge and program realization of the product, includes the iterative sequence with the possibility of return – the several stages of development (identification and the acquisition of knowledge about the subject area, their structuring and formalization, the program realization of the product, testing and implementation), provides, in dependence from the degree of refinement (taking into account the vector of requirements) and the volume of functional capabilities (in the context of the class of solved tasks), the following objective forms of the existence of the expert system – prototypes: demonstration (shows the viability of the approach), research (unstable in work), operational (not optimal by the time factor), industrial (rewritten in the language of high level) and commercial (well documented and reliable system).

The identification of the problem environment (the initial stage of development) showed the need of the analysis of the necessary resources, the sources of knowledge, purposes and tasks. For the obtaining of the correct expert knowledge, forming the knowledge base, it was carried out the analysis of the theoretical bases of extraction (aspects and strategies), the purpose of which was to justify the correctness of choice of the practical method of the extraction of knowledge in dependence from the requirements to the subject area and the collective of developers (expert, analyst, programmer and examinee), and also the advantages and disadvantages of the methods. The acquired knowledge, at the stage of structuring, was under analysis taking into account the subject area, composition, architecture of prototype, the needs of users and the languages of communication (Russian and English).

The formalization of knowledge has shown the efficiency of the frame and object-oriented models. Thus, it were obtained the simplified (experimental) models of knowledge bases in a row of subject areas (the foreign languages – English, the safety of life-activity – the hazardous chemical substances and psychodiagnostics – the testing of analytical thinking by the technique of Miller N.E.). In parallel with the formation of knowledge bases,- for the realization of the program product it was applied the object-oriented paradigm in RAD environment of programming Borland C++ Builder in the language C++, providing the speed of visual development, the productivity of repeated use of the components, the wide set of capabilities in the combination with the newest technological solutions in the area of information technologies and programming. In the context of the fast prototyping technology, it was obtained the demonstration prototype – the program-diagnostic module with the elements of explanation, the structure of which includes the three levels.

The first level (interface) is presented by the two components: the interface of user – provides the interaction with the user in the real time, and also the intellectual editor of knowledge base – allows to preset the parameters of the algorithm of diagnostics and to fill (to modify) by the expert knowledge.

The second level includes the following components: dialog – supports the interaction between the levels of kernel and interface (the first level), explanatory – in case of the incorrect answer of the examinee forms and displays the content of the explanation, working memory – is used for the store of data of the intermediate calculations, knowledge base – contains the structured data (knowledge) by the subject areas (it is provided the switching of existing and the connection of new knowledge bases), and also solver – models the course of reasons of the expert based on the knowledge (available in the knowledge base) and provides the control of work of the system (the operating module).

The third level (interfacing) – is intended for the interaction with the external environment and includes the technical means (for example, the network adapters).

The prototype can be operated in the three modes: administration – provides the objective possibility of filling of the knowledge bases by the subject areas and the setting of the parameters of diagnostics, diagnostics – is intended for the analysis of the knowledge of the examinee by the subject area taking into account the formed algorithm of diagnostics in the administration mode (the given parameters) and training – envisages the selection of algorithm (normal, 25 frame and combined) and the selection of the control of display (manual and automatic).

The artificial competence can not yet completely to replace the human reasoning, because in the area of creative activity the people have great abilities and capabilities compared with the "smart" systems themselves. Nevertheless, the main component of the vector of purpose direction at the development of these systems is the complete replacement of the natural intellectual abilities of the person.