AN INTELLECTUAL SYSTEM FOR LEARNING, MONITORING AND EVALUATING KNOWLEDGE

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Abstract

The project is proposed to develop on the basis of methods and tools of artificial intelligence the system of smart-education. Relevance of the research supported by the fact that now is the era of e-learning, which is faster and cheaper than traditional education, but is has poor quality due to the static electronic educational resources and a lack of communication with the students. If we replace static electronic educational resources to the dynamic smart-futors, e-education to smart-education, and computer testing to intelligent system assessment of the knowledge, then the qualtty of e-learning will certainly rise. Today in orn country, e-learning sector is alnost absent; there are only few systems that automate certain processes associated with traditional education. The project will use modern methods of pedagory and psycholory, as well as the methods of mathematical statistics, artificial intelligence, knowledge representation and processing, object-oriented prograrnming. The main expected results are the knowledge base contents of disciplines in a specific specialty and program implementation of smart-education. Implementation results will conduct unitten and oral dialogue for leanring and knowledge assessment without human intervention, to atfact leading professors of the world, to facilitate access to education and to save financial resources, which ultimately gives rise to the high social and economic effects. The potential consumers of the results will be individuals who can works on the Internet and who want to get a second degree, to improve their skills and retrain. The results of the project focused on the creation and processing of knowledge base in the disciplines of a particular specialty. Their implementation will enable citizens to gain free access to smart education. Development of this project may be adding content and implementation of the processing knowledge in the disciplines of new specialties. This will expand the ftmge of potential customers.

Key Words: Smart-education, smart-tutor, intelligent electronic textbook, adaptive user interface

1. Introduction

Requirements to develop the project. Informatization of society leads change of the situation on the labor market, requiring new skills and expertise. It forces to a lot of people radically change their majority, and learn new knowledge skills. Traditional forms of learning and services are changing in the field of education. The world transfers to new e-education, where the number of students is more than 150 million persons. However for Uzbekistan, the e-learning sector is almost absent. There are some systems that automate few associated processes of traditional education, which don't relevant to e-education. If we compare the traditional education with e-education, second the rate will 30-60% faster than traditional, but unfortunately the quality is low. The reason for the low quality education is passive and static electronic educational resources (usually with simple text or graphics), and the lack of the communication with students in real time. Indeed, the system simply cannot answer student's questions, which can only increase. These problems can be solved by replacing the static electronic educational resources to active and dynamic smart-tutor, e-education to smart-education, testing to intelligent controlling and assessment of students' knowledge. Furthermore, this intelligent electronic education will be shorter, cheaper and has a high quality. All of these above-mentioned arguments are the good requirements to implement the project.

Justification of scientific novelty. Justification scientific novelty consists in that the project offers: to carry out intelligent analysis of the data, which used in the educational process (such as training, monitoring and evaluation of knowledge); build ontological model of smart education with adaptive user interface conduct the written and oral dialogue; developed based on fuzzy neural network and genetic algorithm methods of self-training and self-smart-tutor; to present course material in a specific discipline of higher education or training and retraining of personnel with higher education in the language of knowledge representation based on semantic hypergraphs. Each topic in the training material will be provided with a keyword, the ontological model and consists of thoory, examples, assignments, test questions. This will accomplish the following learning objectives: to review the training material given theoretical information; to reflect on the educational material versed examples; to secure the educational material offered the job; to veriff the inspection, intelligent, fixed training material raises questions; for evaluation by knowledge shall be a

written examination based on fuzzy logic without human interference with speech communication capabilities.

2. Purpose and Objects of the Project.

The purpose of the project is the intellectualization of electronic education, controlling and assessment knowledge. The instrument to achieve the objects is to develop the system of smart electronic education (smart-education) with an adaptive user interface that allows you to write and spoke in natural language.

The objectives of the project are:

1. Justification the methodological, scientific, technological and regulatory base of smart-education. Results: The methodology of smart-education as a new form of educational services; Smart-education concept and model; Project standards for smart-learning and smart-tutor, and also requirements for information security smart-learning and smart-tutor.

2. Development smart-education architecture. Results: The ontological model of smart-education; Users and subsystems functions specification; Tools and technologies specification.

3. Designing and modeling of smart-education. Results: The project of data communication's structure and schemes; User interface project; Neural network models of smart-tutor's self-learning and self-control; Fuzzy linguistic variables of knowledge assessment; Inference rules to evaluate the knowledge.

4. Development information and interface parts of smart-education. Results: Databases and knowledge base on the knowledge representation language; Web interface program; Adaptive user interfaces program.

5. Development communication part of smart-education. Results: Software (application) for data exchange between similar systems of e-learning (LMS); Program that exchange data between e-government and social networks systems.

6. Development service parts of smart-education. Results: Software which automates the activities of staff; Software automate and control the accounts of users, educational services, billing citizens, payment processes and generation of target documents.

7. Development interactive training support-plugins of smart- education. Results: Webinars, virtual classrooms and laboratories organization software.

8. Development intellectual part of smart-education. Results; Software for identification and monitoring: students and their choice. Implementation smart-tutor program that allows educate and rating skills of students; Program which can identify

and explain the mistakes made during the exams; Program for the self-learning and self-control of smart-tutor. Processing knowledge base application.

9. Development curriculum content for the Informatics Master's specialty. Results: Intelligent e-Iearning edition (smart-tutors) for curriculum of the Informatics Master's specialty; Content's Guidelines. User's Guide; Administrator's Guide.

10. Development information security policy of smart-education and secure it. Results: Information Security Policy; Identification, risk assessment, risk management; Backup and information recovery system.

11. Development expert system for evaluation quality of smart-education. Results: the criterion for assessing the quality of smart-education. Fuzzy linguistic variables which evaluate the quality of smart-education; The inference rules for assessing the quality of smart-education; A quality assessment program for smart-education.

12. Development debugging program, testing and development documentation of smart-education. Results: The debugging program that provides operation test and troubleshooting; A text of the program, methods and tests for testing; Protocols and acts of the testing; Administrator's Guide; User's Guide.

The project significance into the national and international level can be justified by the fact that in our country and around the world, there are urgent lack of qualified staff in all areas of economics and management; poor quality, high cost and limited availability of higher education. Implementation of the Project results, will allow receiving a quality education in minimal cost regardless of location, time and duration, as well as allowing gently improved the education system, further training and retraining.

Social demand. The economic and industrial interest in the project implementation and its results are proved by the fact that the development and application of intelligent models and algorithms in the project will cause a lot of interest among scientists and professionals who work in the field of artificial intelligence, as they are valuable scientific data. Results implementation will speed up the rhythm of human learning. The personnel competitiveness will be increasing in the highest international level. Educational institutions will be able to attract in the learning process of famous tutors from around the world without transferring to Uzbekistan. Many companies are interesting quick and quality training for its employees, for example, for this purpose, more than 77% of American companies use e-learning. The result influences to development of science and technology; the

expected effects in society and economics. The principal difference between the idea of the project to its analogies that are encouraged to develop on the basis of methods and tools of artificial intelligence intelligent smart-learning and smart-tutor with an adaptive user interface that enables interaction with students staff-education organization replaced by the interaction with the smart-education, tutors on smart-tutor, electronic testing on the intellectual examination.

The obtained methods and algorithms, knowledge representation and processing affect to development of both theoretical and applied aspects of artificial intelligence and information technology. They can be used in the development of smart systems, also: in education, in medicine, law, e-government, etc. Moreover there is increasing the level of information support and interaction between the participants of educational, scientific and administrative processes; improving accounting processes, analysis and planning of educational activities. The introduction of smart-education will allow holding of reference written and spoken dialogue for learning and knowledge assessment without human intervention, which will improve the quality and objectivity; attract leading professors of the world for making the specific disciplines content that will raise the level of Uzbekistan's education on the world stage; solution of the problem in a convenient location is a convenient time, at your own pace of time, which will provide access to education; reduction in staff costs and premises involved in the educational process, as well as training and retraining, which will save considerable financial resources. As a result, the increases in labor productivity trained and retrained professionals, which in turn impact on reducing the cost of products and technologies. All this will provide the high social and economic effects.

The technology level in the project scope. Since the end result of the project will be ready competitive scientific and technological product, the highest level of technology in the domain of the project management system is proved using an object-oriented database Cache (Inter systems), modern methods and software engineering, Internet technology, multi-core server for multi-dimensional data processing, modeling tool Rational Rose (IBM) for the construction ontologies and interfaces and the development of intelligent systems Intelligent information technology, top group is used os the basis of the project Leading groups in the field of intelligent e-learning technologies are considered National Technological University (USA, e-learning programs in engineering), open University of Hagen (Germany), INTEC-College of Cape Town (South Africa), Spanish National

University e-learning, open Business School of British open University, Australian territorial information network.

The obtained result target consumers will be individuals regardless of gender, ethnicity, age, nationality, place of residence, social status, place of work etc. Owning Uzbek, Russian and English languages and skills to work on the Internet, as well as legal entities regardless of form of ownership, forms of organization the object of activity, location and jurisdiction.

3. Research Methods

Description of the scientific methods used in the project as a justification for ways to achieve the goals, a justification for the chosen approach. The following research methods are selected to achieve the goals of the Project:

-theoretical analysis of pedagogical, psychological, methodological literature on the research problem;

-synthesis of methodological, psychological, didactic and methodological literature; studying leading practices;

-experiment and testing systems as the most objective verification underlying concepts of their construction, observation, inductive and deductive methods like the logical methods to generalize the empirical data;

-archival methods (the study and evaluation the products of future and current experts);

-diagnostic methods (testing, generalization independent characteristics);

-tutors' testing software and pedagogical experiment involving students in the pilot mode;

-math statistics methods for the analysis experimental data, a graphical representation of the results. To justify the chosen approach and ensure the adequacy and compliance with declarative and procedural characteristics, the developed ISLCEK components are planned to integrated into a single model of methods and artificial intelligence algorithms, also using modern software engineering:

-knowledge base to build a database with the inference rules;

-semantic networks for knowledge representation;

-datamining methods for processing the knowledge base and documents;

-fractal theory for copying functions and classes with instances;

-cognitive graphics for dynamically display data and variables in the form of Chernoff faces;

-fuzzy logic to search by the fuzzy criteria, the use of membership functions and linguistic variables for fuzzy inference;

-expert systems to develop problem solvers with a clear and fuzzy inference;

-genetic algorithms to find the most best answer;

-soft computing is more comfortable manipulation of weak-structured objects governance;

-morphological and syntactic text analyzers to automate its presentation in the language of knowledge representation;

-n-grams, the reverse processing, decision trees for the analysis of the text;

-mobile technology to develop mobile applications;

-Cache post-relational object-oriented database management system to create a database and knowledge.

4. Conclusion

Project implementation will cause a huge interest of scientists and professionals working in the direction of artificial intelligence and intelligent information systems, as an opportunity to formalize and automate the processing of knowledge, which consist of content from various disciplines at all levels and types of education. Implementation of the results of the project will improve the quality and image of Uzbekistan education, as in the preparation of the content will attract leading scientists and educational services will be personalized.

Implementation of the results of the formation, as will be used by intelligent knowledge without human intervention, there is Internet. project will increase the objectivity and identity e-learning systems, monitoring and evaluation of which are available anywhere in the world where Improving accounting processes, the results of the analysis and planning of educational activities that will increase the efficiency of information support and interaction between the participants of educational, scientific and administrative processes. Implementation of the results of the project will save the costs of training, maintenance of premises, maintenance of staff of educational institutions and others. The applicability of the scientific results obtained by the fact that they can be used in the development of intelligent systems not only in the field of education (smart schools, colleges smart, intelligent centers of excellence in the company), but also in medicine, law, e-government and etc. The target consumers of the results will be individuals regardless of gender, ethnicity, age, nationality, place of residence, social status, place of work, and others. The results will affect the development of a new branch of science informatics associated with the ontological domain modeling, knowledge representation and processing, as well as the impact on the development of intelligent information technologies.

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