THE ROLE OF ARTIFICIAL INTELLIGENCE AND WEB INTELLIGENCE IN EDUCATION: CURRENT DEVELOPMENT AND FUTURE PROSPECTS

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Abstract

'Artificial Intelligence' (AI) is a term which is variously interpreted. Some of us may relate it to robotics while some others to science-fiction; again some may associate the term generally to anything that deals with computers and machinery. Over the years, researchers have introduced artificial intelligence as a branch of computer science dealing with the reproduction of intelligent behavior in computers. But at the same time, new research questions and issues are simultaneously generated. Two of the most prominent of issues are how artificial intelligence is related to education and what the new ways to encourage students with their learning through the use of artificial intelligence applications. This paper, aims to highlight the past and present trends in the application of AI in education. The research is undertaken with respect to AI techniques and focuses on the key application of AI in education: intelligent tutoring system. The paper also includes some general reflections on the current state of the art and some speculations on possible future directions for AI in education.

Introduction

The constant growth in technology has significantly transformed the world during the past decades and developed computing command in every important phase of our life. One of the most important objectives of computer science was the mission to understand and imitate human intelligence in all forms. This mission had attracted large number of researchers to develop the field of AI (Sharma, 2013). Various researchers defined that AI is a method and design of expert systems in a modest form, which are able to identify their environment and take action to increase the possibility of success.

Research and study empower and enable many areas where machine has an observable advantage, and education is also a part of them. One of the fields of research communities of artificial intelligence deals with the intersection of AI and education. The previous literature proposed that traditional teaching is not always an efficient way for students. Therefore, the vast majority of researchers and scientists seem to support the idea that AI techniques can successfully contribute in different areas of education. Recently, some barriers have been raised in this area such as special emphasis on educating children according to their needs and ensuring the efficiency of learning tools etc. Therefore, AI technology provides a useful tool to overcome these barriers.

To achieve this end, this paper will focus on important aspects of web intelligence (WI) in the context of AI in education. It will also highlight other similar problems related to the field of education. Further, this paper will provide the key ideas for future research in the direction of education using artificial intelligence.

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Contribution of WI and AI in Education

Previous studies reveal that AI and WI have contributed to the research community that is concerned with the connection of artificial intelligence, web intelligence, education and research (Clancey, 1986). This community has already made progress to study a number of issues generally relevant to WI such as in the perspective of learning and teaching theories and systems, which aimed at sustaining human learning by communicating with students and authors and by collaborating with other similar agents, in the context of interactive learning environment (Beck, 2005). Therefore, AI provides the strongest base for knowledge representation by providing various methods. We now look at some specific applications, which are used by educators to make possible efficient learning.

1. Intelligent Tutoring System

It is a program that provides immediate and pre-developed instructions designed specifically for students or learners to help them with a task. Intelligent tutoring systems or ITS therefore replaces a human tutor with a machine. One of the greatest benefits of personalized tutoring through ITS is that the students can learn at their own pace. Intelligent learning environment is a program in which the student is placed in a problem-solving situation. However, ITS programs involve intensive designing that is complex and time consuming (Aleven, 2009).

2. Adaptive Hypertext Systems

This is a method used by educators to enhance education, which is alternatively known as adaptive hypermedia. It is deployed in many distance learning and e-learning courses (Carr, 1977). It is a system that channelizes the student to the right links or content. Adaptive hypermedia is similar to web personalization (Woolf, 1992). If used in a proper way, this program will give students an influential set of approaches and guidelines to assist in their learning.

3. Web-based Intelligent System

Web-based intelligent system plays an important role in education. One of the major issues in education is personalization of learning. Therefore, to work over this area, web intelligence provides a tool in the context of AI in terms of web-based intelligence system, which is able to personalize interactions with each learner by keeping track of his recent activities and relating the topics he learns and the sites he accesses during different learning sessions (Woolf, 1992). Additionally, web-intelligent educational server actively helps the learner to interact during the execution of task.

4. Intelligent Learning Environment

Intelligent learning environment is an educational method used to enhance learning through social interaction with the help of a computer or connectivity of internet. One of the major issues for educators is to monitor their students' learning, which is time consuming, and to provide review and grade (Sasikumar, 2012). Therefore, the learning environment provides a base for educators to assist and improve their students learning.

Future Scope of Web-Based AI in Education

AI systems and programs are heading towards redefining the education system of the future. To justify this point, we shall discuss the ever-increasing demand for designing AI systems vis-a-vis the smart ways in which AI is proceeding to revolutionize the education experience of the next generation. The key ideas are summarized below:

1. Automated Support to Students

Intelligent computer system provides a way to transform interaction between the college and students by developing proper perspectives with the help of information gathering. The best example to demonstrate this concept is the recruitment of students. AI is often deployed to help the students to choose the best discipline of study (Teachthought, 2014). However, it is essential to modernize intelligent computer systems further in order to make it more efficient and satisfy every facet of imparting knowledge in the field of higher education.

2. Designing Advance Courses

According to research studies, the prominent issues in the education system are the structure of educational materials, which may sometime create doubt about certain topics and lack of awareness about the new advance courses. Research studies reveal that Artificial Intelligence has been found good solutions to overcome these issues by providing online course provider websites and e-updates. There are various online websites available on the internet market based on this concept such as Coursera, a well-known open online course provider. However, making this area more advanced the future work can formulate a framework incorporating AI techniques in education, where students can ask their multiple query and system may generate immediate alerts to students to provide correct answers to their query (Teachthought, 2014).

3. Adapting Learning

Various researchers have found that Adaptive Learning has a significant impression on education in this scenario. And with the advancement of AI, the coming years will improve and expand the adaptive programs up to certain extent. The future work can be mechanized education based on AI techniques to help the students at different stages to work together in one place, and to provide support when they are needed (Daniel, 2009).

4. Automated Progress Tool

AI is a field of mechanism and advancement of techniques which provide help to students and professors to get information about new courses according to their needs. But at the same time, it can also provide an automated progress tool for students where students can get support to find major areas to get success and struggle (Daniel, 2009). Additionally, it can also provide the performance alert to students and to professors in certain concepts where they need to improve.

5. Mechanized Algorithm Methods

The foundation of web intelligence is efficient ways to represent appropriate knowledge and efficient algorithms to make use of that knowledge for solving problems. The algorithms are usually dependent on the area of interest. This algorithm method, which follows certain rules provides a system support to help students to learn and way to deal with trial and error. It could offer students a way to experiment and learn (Daniel, 2009).

6. Personalized Intelligent Tutor

AI techniques can further propose a personalized intelligent tutor where students can enhance their learning skills using AI system. AI tutor can offer solution for improvement and guidance to work in error-free environment (Wiley and Sons, 2008).

7. Model Expertise

The major role of AI in education is the prospect to model expertise. The system is well-informed in the field to be skilled. Model expertise enables the system to execute interactions that could not be conducted if the system worked with pre-stored solutions. In that the system is able to answer the problems in the place of learner. But at the same time, it is essential that AI techniques should support expert-learner communications during the session of problem solving. So future work can be to increase the quality of AI techniques and increase support for interaction (Daniel, 2009).

A pictorial representation of the aforementioned research directions is given as follows in Fig.1:

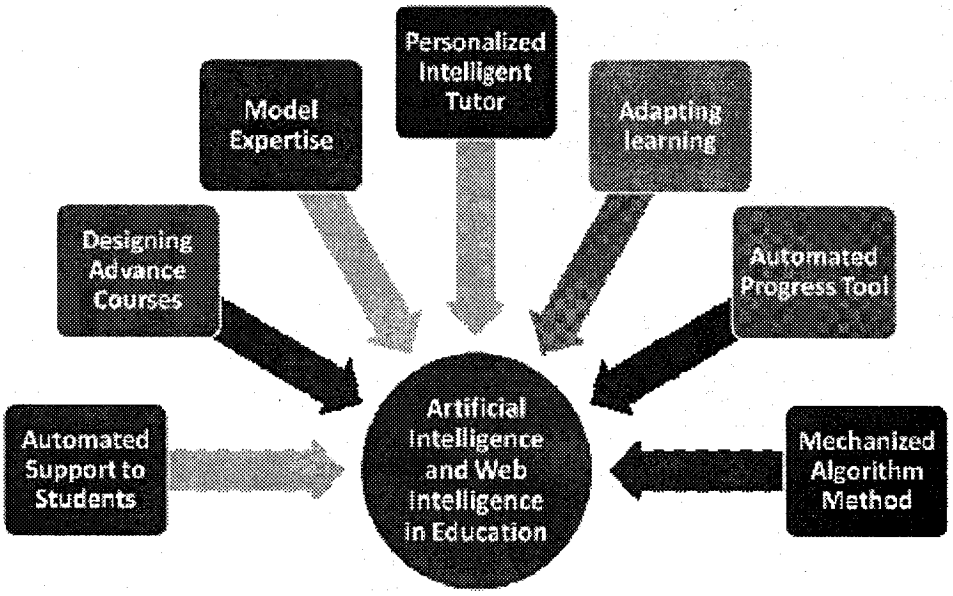

Fig.1: Future Research Scope

Conclusion

Research studies reveal that web intelligence in context of AI has a great impact on education. In the current scenario, the demand to formulate a framework, based on integration of AI techniques, ontologies, knowledge-based matrices and others techniques/tools in education have increased dramatically. Accordingly, the paper presented a systematic discussion on existing application of AI. Additionally, it focused on key ideas providing/ delineating future scope of AI in education. The paper will provide a significant support to the entry-level researchers in the related area/s to get the direction/s for future work. To formulate a framework for integrating AI techniques in the education may be one of the prominent areas of further research.

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