

Contribution of Artificial Intelligence to the E-learning

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Abstract-Artificial intelligence (AI) is a property of machines which gives the ability to copy the human thought process. It is concerned with the design of intelligence in an artificial device. This term was defined by McCarthy in 1956.

There are two ideas in the definition.

1. Intelligence
2. Artificial device

This paper highlight to potential contribution of Artificial Intelligence (AI) to the e-learning environment. Artificial Intelligence enhances computer assist instruction systems by providing human like intelligence to the system. Here, we are focusing some AI techniques, which could be the main technology for e-learning. Also we discuss, how Intelligent Tutoring System (ITS) is proved as promising field to the training programmes and how AI could contribute to issues like Naural intelligence, learning from experience & intelligent interaction between human being & machine.

Keywords: *Artificial Intelligence, ITS, CAI, ML, NLP, e-learning, CA, ILE*

1. Introduction

If you ask to our respected senior citizen those who have retired from service or business, they all have very common thing that, the respect & memories of the educational institutions where they studied and old days traditional teaching. They shared their warm memories which are associated with institutes. In today modern time as the field of computer science and information technology has reformed day-to-day activities of entire human life. The computing field has provided us all that even we could not have dreamt.

The remarkable growth of this field has impacted educating in many ways.

Artificial Intelligence (AI) is the science & engineering of making intelligent machine, especially intelligent computer programs. It is related to the similar task of using computer to understand human intelligence. In fact, intelligence involves mechanism & AI research has discussed how to make computers to carry out some of them. AI makes traditional teaching more effective.

2. What is E- learning

E- Learning refers to learn that is to be delivered or enable via electronic technology. It encompasses learning delivered via a range of technologies such as the internet, television, videotape, intelligent tutoring systems, and computer-based training.

E-learning is subset of two large words, specifically, "information technology" and "education and training". It can be valuable when used as a part of well-planned and properly supported education and training environment. However, e-learning does not replace or render existing educational theories and approaches.

3. Intelligent Tutorial System (ITS)

An **intelligent tutoring system (ITS)** is a **computer system** that aims to provide immediate and customized instruction to learners, usually without requiring intervention from a human teacher like online teaching. It is difficult to provide a personal training assistant for each learner, however, a virtual training assistant that captures the subject matters and teaching expertise of experienced trainers provides a captivating new option. The concept, known as Intelligent Tutoring System (ITS) has been pursued by researchers in education, psychology and artificial intelligence. ITS can also be classified by model tracing tutor algorithm. One of the objectives of Intelligent Tutorial System is to adopt hypermedia courses to each individual user by means of control of learning level, control of the course navigation, revision to available information, revision of the training methodology, explanation of errors, answers to the student's questions, advice, etc. In other words, intelligent tutoring system is a model which enables student to be evaluated and taught a subject and also for the education to be adapted to the students performance.

The traditional ITS model contains four components:

- Expert Module / Domain model / cognitive model / expert knowledge model
- Student Module / model tracing
- Curriculum Module / Tutoring model
- Interface Module.
- Expert Module contains information about the subject knowledge domain. Its contain the concepts, rules, and problem-solving strategies of the domain which is to be learned.
- Student Module can be thought of as an overlay on the domain model. It contains information about the student's understanding of the knowledge domain. It is considered as the core component of an ITS.
- Curriculum Module contains rules that allow it to judge how well the student's understanding of the subject domain matches actual knowledge structure.

It also accepts information from the domain and student models and makes choices about tutoring strategies and actions.

- Interface Module presents the user with a uniform environment within which instruction, analysis, remediation, and user driven learning may take place.

The user interface component integrates three types of information

- Knowledge about patterns of interpretation and action
- domain knowledge needed for communicating content; and
- knowledge needed for communicating intent

The Aim of ITS is to create a learning environment where the role of human teachers is replaced by the tutor module and domain knowledge module. A system plans and teaches individuals by maintaining its belief about each in the student module and acts according to the best teaching strategy

ITS can also be classified by model tracing tutor algorithm.

4. What AI present

Teaching and learning is not a simple process. Only train humans can teach effectively. Computer Assisted Instructions (CAI) could be useful in learning at an elementary level and even then can not compete with train humans in term of teaching quality. The creation of the ALGOL programming language in 1958 which was enabled in many schools and universities for beginning to develop Computer Assisted Instruction (CAI) programs and

Computer Aided Learning (CAL) which are lacking "the flexibility and learner- centered orientation of ITS" The complexity of the teaching task is the result of following main factors:

- Adaptive teaching strategies - Depending on the stage in the learning process, different subjects requires different instructional strategies at different levels.
- Continuous assessment of students - Human teachers do not rely on the test result for student's assessments, but they constantly assess the class and individual through various inputs like attention level, understanding level etc.
- Personalized teaching - Human teachers are flexible. To make their teaching effective, they deliver the content ranges from class level down to the individual student's level.

Artificial Intelligence enhances CAI systems by providing human like intelligence to the system. To enhance the efficiency of computer programs in handling the above mentioned factors, computer must be equipped with necessary sensors. They must be able to make sense out of their senses, and then they can act logically. They should be able to learn and be adaptable to new environment. We highlight the

current developments in these issues and their applications in intelligent tutoring systems.

i) Aural Capability

Domains such as language and music require hearing ability in computers. The ability to here also implies to an understanding of what is being heard. Advances in speech recognition, speech processing and natural languages processing provides useful applications in many areas including ITS. At the current state-of-the-art, we have enquiry counters where clients can make the enquiries using interactive telephone dialogue. Clients talk to a computer as if they are talking to another human being.

ii) Visual Perception

Many recent works in education address the issues of affects and emotions. Information regarding students' affects could be useful in the adaptation of teaching strategies. This area is however still not mature.

The ability to visualize can be useful in teaching music performance as well. In many performing skills, the techniques are closely related to the poster (e.g. hand-shape, sequence of movements, etc.)

iii) Inference mechanisms

The talking which so far about perceives and acting (via speaking). Perhaps, the most important aspects of intelligent behaviors is about inference power. This is the area where most AI researchers have been investigating.

Logical inference is suitable for domains at a course grain abstraction. For example, the encoding of domain knowledge in a rule-based expert module. Probabilistic and statistical inferences are suitable in handling uncertainties in the domain. Bayesian networks, artificial neural networks are the most popular inference techniques.

iv) Machines that learn (ML)

One of the main secret ingredients for the success of any ITS system is the accuracy of its student model. Real students are dynamic. As such, ITS systems must possess the learning capability so that changes in students could be tracked. Learning is along standing research in AI and this is one of the areas where AI could make a useful contribution to ITS in e-learning environments.

v) Interactive learning environment(ILE)

Finally, we would like to comment on the interaction between human and machine. The interaction between learner and computer in the main ingredient in the success of an ITS. Information from the interactions serves three purposes:

- to perceive useful information from the environment,
- to model an accurate student model, and
- to actuate the environment (e.g., feedback) with useful information.

5. Application in E-learning

Here we highlight AI application in ITS which a part of the e-learning environment. Let us look one application of language teaching

5.1 Language Teaching

Teaching language involves the teaching of reading and writing skills. The whole scene involves content development, the delivering of content and an assessment of the delivering process. Here, we highlight the assessment dimension in language teaching.

Speech recognition is a hard problem. Same words or phrase contribute two different meaning in two different contexts. However, with a supplied context, this is not too hard problem. Given a word, a phrase, or a sentence, assessment of pronunciations could be automated using speech technology. This opens up a whole new approach for language teaching and learning. An ITS could be very useful in enhancing essay writing. Students have a constant need for tutors to give feedbacks on errors or mistake as well as meritorious use of language. Highlighting errors and mistakes could be easily automated using the spelling check and grammar check utilities. One of the major restrictions in most spelling check and grammar check utilities is the lack of context analysis(CA). To handle context dependency, sophisticated Natural Language Processing (NLP) techniques could be employed then the promise of an ITS which could benefits writing skills is not far away.

6. Conclusion

Many traditional instructional methods presents learners with facts and concepts followed by test questions, but artificial intelligence involves in capturing domain knowledge, providing intelligent assessment power and providing intelligent feedback etc. Thus as compare to old days of our citizens, use of information technology in general and Artificial Intelligence in particular area makes the education highly interactive, highly accessible, and highly individualized.

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