

e-Learning Korea 2017: Conference

August 30-31, 2017 | Coex, Seoul, Korea

ARTTIFICIAL INTELLIGENCE APPLICATION FOR OPEN-ENDED LEARNING ENVIRIONMENT

KI-SANG SONG

Department of Computer Education, Korea National University of Education,
Chungju, Korea

As technology develops, the learning environment of classrooms transits from traditional book-based learning into tablet or computer-based learning with digital textbook or rich learning contents. This new teaching-learning environment has the advantage of continuously monitoring learners' learning processes, so that instructor can grasp the accomplishments and the weaknesses of learners and the instructor can feedback in a timely manner.

In traditional LMS - based learning system, where most of the e-learning materials are designed in a linear manner so that the learner must follow the learning path determined by the instructional designer is relatively easy to monitor learner progress. This linear learning path is defined by the instructional designer in advance so that the learner must follows the given learning paths linearly according to the behaviorist viewpoint. In other words, linear learning path based e-learning contents is designed to lead to motivation and participation in learning by delivery of learning contents, repeated practice, and testing by following a systematic learning path. In contrast, the nonlinear learning path based e-learning content allows learner to follow learner's learning paradigm, and the learning goals so that the learning path has a nonlinear structure in which the learner sets himself or herself. In the case of the nonlinear learning path, it is necessary to provide a learning environment that allows the learners can extract and edit the learning contents according to their plans, and provide a learning environment in which the learning process can be selected by the learner.

Compared with linear learning path based e-learning contents, the nonlinear learning path has advantages of motivating and engaging learners in more adaptive and personalized learning environments. Nevertheless, it is not an easy task to understand the state of the learner when learning activity is done by using the computer entirely. Therefore, in this presentation we wants to show the possibility of a learner situation recognition applying learning analytics method, which is one area of artificial intelligence, considering the learning situation such as programming education where the individual learning path is unlimited.

There are a number of reasons why we are considering a programming education environment that targets these problems. First, if the learning path is infinite, the learning path should not be limited by the instructional designer as in the existing LMS-based e-learning contents. In programming class, if the instructor gives task, then learners may create code utilizing the programming language. We assume that such teaching-learning environment is totally opened learning environment with infinite learning paths. Second, in the learning system using only computers, all learning cases can be monitored. Currently available such learning system that does not use e-learning contents but the learning process always can be monitored through the computer is the computer programming class.

For this, first we examine the limitations and improvement possibilities of the intelligent tutoring systems (ITS) based on conventional artificial intelligence, and explain the differences between the traditional LMS and the digital teaching platform (DTP) that provides real-time monitoring of students' progress. Unlike the traditional ITS, where learner model, pedagogy model and domain model have been implemented with traditional knowledge base or expert systems, DTP allows teachers pre-planning of questions to be delivered to learners during classroom. The DTP monitors learners achievement while learners solve the pre-planned questions in real-time, and the teacher may be empowered by grasping classroom teaching results in real-time. Teacher can figure out whom is need help or advance in the teaching by the information provided the DTP, the DTP can support teacher in the classroom instead of replacing teachers from the classroom applying ITS. Although the DTP is not equipped with artificial intelligence but may support teachers in real-time, we need to expand this idea into new learning environment for open-ended learning.

Therefore, we are developing a learning analytics technology based learner progress diagnosing system for programming class. Periodical snapshot of learner's programming code will be gathered, and analyzed in real-time, and the DTP does. However, our system did not provide predefined learning paths, and each student progress will be analyzed using collected big-data. Only the idea of real-time formative assessment of DTP in classroom teaching has been extended and applied to realize the possibility of implementing learning analytics based open-ended learning environment.

Keywords: Learning Analytics, Intelligent Tutoring Systems, Digital Teaching Platform