Gradual Learners’ Assessment in Massive Open Online Courses Based on ODALA Approach

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ABSTRACT

This article proposes a gradual assessment process combined with an adequate learner modelling based on ODALA approach that can be an effective add-on for massive open online course (MOOC) platforms and engineering. The proposed learner modelling includes five dimensions: general information, disciplinary cognitive state, learning styles, preferences and behavior. This article focuses on the cognitive state dimension that is based on an assessment pyramid with four levels: closed-ended questions, half-open questions, open-ended questions and problem situations. The assessment pyramid is the backbone of the learning process since it needs a gradual progression with an adequate methodology where various computer aided or completely automated evaluation activities are proposed. The transition from a level to another is a conditional one since there are minimal threshold of disciplinary knowledge acquisition. An evaluation prototype was tested with the algorithmic discipline and developed so as to access the feasibility of our proposition.

KEYWORDS
Assessment Pyramid, Automated Learners Assessment, Cognitive State, Learner Modelling, Massive Open Online Courses, ODALA, Peer Assessment

INTRODUCTION

Massive Open Online Courses (MOOCs) appear to be as much about the collective grasping of universities’ leaders to bring higher education into the digital age as they are about a particular method of teaching (Pappano, 2012; Siemens, 2013). However, a variety of challenges/problems has emerged. These challenges should be considered when designing, implementing, and deploying MOOCs (Koutropoulos and Zaharias, 2015). Learner motivation is one of the most interest challenges in higher education stakeholders. Many factors influence learner motivation. These include future economic benefits, development of personal and professional identity/identities, challenges and achievements, enjoyment and fun (Yuan et al., 2013). Moreover, Veletsianos (2013) founds or finds another factor, which is the absence of social interactions with other learners. This made learners feel less motivated to think deeply about the content. Another important challenge in MOOCs is high

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dropout rate. This latter is due to a variety of reasons such as a lack of learner motivation, insufficient prior knowledge, failure to understand the content and have no one to turn to for help, lack of time due to having other priorities and ambiguous assignments and course expectations (Sachdeva et al., 2015; Hew and Cheung, 2014). At the completion of most MOOCs, learners who have met certain requirements (quizzes) receive a certificate. A lack of certification for free access participants is another common problem in MOOCs. The statistics underline that these problems are mainly related to the ineffective assessment methods for a meaningful learning process looking at the objectives and giving feedback for individual learning (Miranda et al., 2013). The study of existing MOOCs showed that one of the main components that requires improvement is the learner’s assessment for certification. Furthermore, the big data about the learners, collected from MOOCs, especially information about the learner’s cognitive state should be organized, so as to facilitate access to learner’s information. To reduce the impact of these challenges, we propose a new design methodology of a MOOC system. The MOOC system proposed includes a learner modelling for learner’s gradual assessment, guided by a pyramid of pedagogical activities.

Section 01 gives the background of our proposition, exposing learner assessment in e-education systems, particularly in MOOCs. Section 02 presents the main parts of the proposed MOOC architecture with fine points about each module. Section 03 displays the first evaluation and validation of our proposition. We conclude with a summary about our contribution and a view on our future works.

BACKGROUND KNOWLEDGE AND RELATED WORKS

Based on research work conducted so far, in this section we give an overview about learner assessment and learners modelling, especially in MOOCs.

Automated Learner Assessment

Recently, the use of a computer for assessment purposes has substantially increased (Farrús and Costa-jussà, 2013). According to Brown and al. (1999), the aims of using computer assessment include achieving and consolidating the advantages of a system. First, reduce the professors’ workload by automating part of the learner evaluation task. Then, provide the learners with detailed information on their learning period in a more efficient way than traditional evaluation. Finally, integrate the assessment culture into the learner daily work in an e-education environment.

Assessing learners in an e-education environment often relies on closed-ended and half-open questions because the assessment of these two types is easy to implement. The closed-ended questions are commonly in the form of multiple-choice questions (MCQ), widespread and often used for tests that many people are willing to take, Holed texts that are current in language learning, Matching questions, dropdowns list, etc. The half-open questions are a compromise between the closed-ended and open-ended questions. David H. Hargreaves called this kind of questions a half-open question, giving a simple ‘yes’ or ‘no’ answer makes it a closed-ended question. When some elaboration is added, the question is then considered a half-open question (Hargreaves, 1984).

However, e-education environments are often incapable of assessing the open learner answers; therefore, human intervention becomes necessary. In order to build an e-education environment, that can automatically assess open-ended question, varieties of approaches / methods / techniques have been used (Cutrone and Chang, 2010; Snow, 2012; Quah et al., 2009; Elsayed et al., 2013; Higgins et al. 2003; Bouarab-Dahmani et al. 2010). In this paper, we use the ODALA approach for automated assessment of open-ended questions in the proposed MOOC.

ODALA Approach

ODALA approach (Ontology Driven for Auto-evaluation Learning Approach) (Bouarab-Dahmani et al., 2009, 2010) is proposed as a solution for the automated evaluation of the learner’s state of knowledge in the case of open-ended questions. This approach focuses on a granular and ontological
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