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Towards bringing adaptive micro learning into MOOC courses

Geng Sun

University of Wollongong, gs147@uowmail.edu.au

Tingru Cui

University of Wollongong, tingru@uow.edu.au

Kuanching Li

Providence University, kuancli@gm.pu.edu.tw

Dongming Xu

University of Queensland, d.xu@business.uq.edu.au

Shiping Chen

CSIRO ICT Centre, shiping.chen@csiro.au

See next page for additional authors

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Towards bringing adaptive micro learning into MOOC courses

Abstract

In this paper we illustrate a proposal with regard to providing learners adaptive micro learning experiences, which can be fulfilled within fragmented time pieces. The framework of our system is demonstrated, while it aims to deliver customized micro learning contents taking into account learners' specific demands, learning styles, preference and context.

Keywords

mooc, into, learning, micro, courses, adaptive, towards, bringing

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Authors

Geng Sun, Tingru Cui, Kuanching Li, Dongming Xu, Shiping Chen, Jun Shen, and Wanwu Guo

Towards Bringing Adaptive Micro Learning into MOOC Courses

Geng Sun, Tingru Cui
School of Information Systems and Technology
University of Wollongong
Wollongong, Australia
gs147@uowmail.edu.au, tingru@uow.edu.au

Dongming Xu
UQ Business School
The University of Queensland
Brisbane, Australia
D.Xu@business.uq.edu.au

Jun Shen
School of Information Systems and Technology
University of Wollongong
Wollongong, Australia
jshen@uow.edu.au

Kuan-Ching Li
Dept of Computer Science and Information Engineering
Providence University
Taichung, Taiwan
kuancli@pu.edu.tw

Shiping Chen
ICT Centre
CSIRO
Sydney, Australia
shiping.chen@csiro.au

William Guo
School of Engineering and Technology
Central Queensland University
Rockhampton, Australia
w.guo@cqu.edu.au

Abstract—In this paper we illustrate a proposal with regard to providing learners adaptive micro learning experiences, which can be fulfilled within fragmented time pieces. The framework of our system is demonstrated, while it aims to deliver customized micro learning contents taking into account learners' specific demands, learning styles, preference and context.

Keywords—MOOC, Micro Learning, Educational Data Mining

I. INTRODUCTION

The arising of massive open online course (MOOC) is trending. Although educational professionals have strived extraordinarily on exploring the MOOC format as a regular pedagogical approach for m-learning [1], established studies show that MOOC are currently suffering from low completion rate. In this paper, we will illustrate a proposal with regard to providing learners adaptive micro learning experiences, ideally with mobile devices. It aims to give learners opportunities to make the best use of every fragmented piece of time so as to effectively engage in the MOOC learning. Educational data mining (EDM) technique will be applied to understand learners and the settings in which they learn.

II. BACKGROUND AND CURRENT ISSUES

A. Background

In literature, "micro learning" processes cover a time span from few seconds (e.g. in mobile learning) to up to 15 minutes or more. Another explanation of micro learning is deemed web focused: 'micro-learning refers to short-term learning activities on small learning units. With mobile devices, quite often learners accomplish learning missions in a short time period. As micro learning evolves, micro-content delivery

with a sequence of micro interactions enables users to learn without information overload [2]. It is found that MOOC follows the principles of micro learning – a MOOC is typically designed around the principles of micro learning enabling learners to go through bytes of learning in short duration. The modules ideally do not exceed 15 minutes. These small learning bytes not only aid quick assimilation but also makes it possible to learn on the go, thus reducing the dependency on a fixed time slot or the need to take a large chunk of time out of one's working day.

B. Research Challenges

Being on the go is fraught with distractions. Students are often found themselves in situations with unpredictable but significant annoyances on their attention. It could be very difficult for learners to quickly choose the preferred and suitable course chunks in a timely manner. Moreover, there are studies indicating that personality and learning styles play significant roles in influencing academic achievement. In the current situation, learning resources are generally divided and wrapped up by education providers or courses lecturers. It considerably lacks flexibilities to fit every specific learner's time availability so that learner should get accommodated to the time length of course setting and manage to squeeze time to accomplish those learning activities.

III. RESEARCH DESIGN

A. EDM for Micro MOOC Learning

1) Learner Behaviors

Identifying learners' patterns and extents of engagement and learning time distribution are of priority to understand whether and, if so, how often learners use micro learning

approach to acquire knowledge from MOOC courses. How they get connected to internet is also valuable for analyzing their learning habits. Learner behaviors tracking can go deep into the length of each learning time pieces.

2) Micro Learning Resources

For non-micro learning resources, EDM is utilized to discover which stages of them are generally finished in relatively larger time lengths, and determine time spans where pauses made by learners usually fall in. EDM can be carried out more deeply to find out actually why learners spent more time on these stages and made such pauses.

3) Resource Clustering

It is feasible to utilize EDM to identify micro learning resources which have similarities and relevance [3]. In addition, based on learners' historical learning records, the sequences by which learners go through resource chunks can be sorted out. EDM can contribute to explore latent learning paths and expose them to all MOOC learners.

B. Research Motivation and Objectives

How to divide the content of an entire course into small chunks is the crucial factor in regard to whether learners can enjoy the micro learning experiences in fragmented pieces of time, usually less than 15 minutes. Learning contents must be adjusted to suit the limited configurations of mobile devices, such as screen size and typing methods.

In this paper, we attempt to employ design science to overcome the above challenges so as to deliver learner customized learning resources, in the form of small chunks or fine-grained units. Then learners can easily complete the learning process of each unit within fragmented pieces of time.

C. Framework of Our Solution

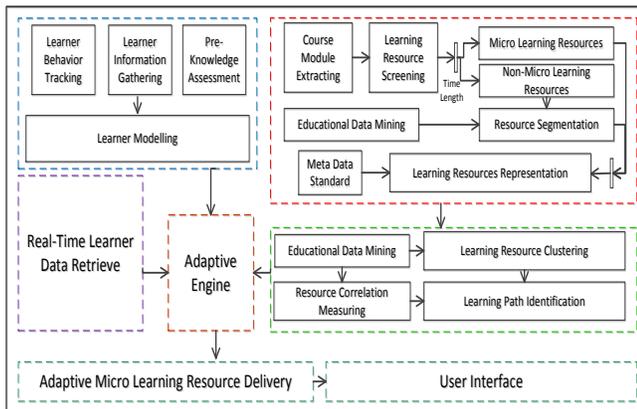


Figure 1. Framework of Adaptive Micro Learning System

The framework of proposed system is shown in Figure 1.

The Learner Modelling module aims to build a specific model for each learner, on the basis of his/her historical learning behavior. This module assesses their pre-knowledge and gathers basic information about learning styles, preference, learning purposes. These features are marked up by a set of measurable variables. It is also provided with a function, which tracks learners' behaviors during micro learning process and ensures their models being kept up-to-date once new data are detected or generated.

The Learning Resource Representation module stores all representations of the available micro learning resources. It extracts course modules from well-developed MOOC courses. Based on their time lengths, they are categorized into micro learning resources (less than 15 minutes) and non-micro learning resources. Referring to the results of EDM, these longer course modules are cut off programmatically and encapsulated into small units with reasonable time lengths. Each unit covers the complete information of a learning section, which includes the conditions of beginning and ending, has coherent content, and can be studied individually. A metadata standard for describing micro course units is going to be established. According to this metadata, all learning resources are represented in terms of discipline, key words, time length, language of instruction, popularity, difficulty and so on. Data related to good-quality and mostly-followed/discussed learner-generated content, can be refilled in to the Learning Resource Repository in order to support peer-to-peer learning in MOOC.

A Real-Time Learner Data Retrieve module retrieves learners' real-time data, including their learning progress and time availabilities (how many minutes they prefer to use in the moment). Furthermore, in the Learning Resource Repository Module, selected course modules are clustered using text/data mining technologies. This module also measures correlations among chunks, or, if feasible, derives correlations from existing MOOC course modules. It helps to set learning start point and termination point, it also distinguishes the suggested sequences of learning resources and identifies a learning path among them.

Taking data from all the above modules as input, the Adaptive Engine acts on providing learners with customized learning resources matching their current micro learning context, personal demands, learning styles and preference. It is the core of the proposed system, which embeds artificial intelligence technologies to realize the adaptive mechanism.

IV. CONCLUSION

In this paper we introduced a proposal of enhancing current MOOC learning experiences and outcomes by bringing adaptive micro learning concept into it to pursue better learning experience and outcomes. We will also carry out case studies focusing on finding out how our proposed system can facilitate micro learning in MOOC and how it can, qualitatively and/or quantitatively, help learners achieve their learning expectations.

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