

4th International Workshop on Personalization Approaches in Learning Environments (PALE 2014)

Preface

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Abstract. Personalization approaches in learning environments can be addressed from different perspectives and also in various educational settings, including formal, informal, workplace, lifelong, mobile, contextualized, and self-regulated learning. PALE workshop offers an opportunity to present and discuss a wide spectrum of issues and solutions. In particular, this fourth edition includes 8 papers dealing with student's performance, modeling the user profile in a standardize way, computing attributes for learner modeling, detecting affective states to improve the personalized support, and applying user modeling approaches in new contexts, such as MOOCs and gamified environments.

1 Introduction

The 4th International Workshop on Personalization Approaches in Learning Environments (PALE)¹ takes place on July 11th, 2014 and is held in conjunction with the 22nd conference on User Modeling, Adaptation, and Personalization (UMAP 2014). Since the topic can be addressed from different and complementary perspectives, PALE workshop aims to offer a fruitful crossroad where interrelated issues can be contrasted and discussed. PALE 2014 is a follow-up of the three previous editions of PALE (which took place at UMAP 2011, UMAP 2012 and UMAP 2013).

In order to foster the sharing of knowledge and ideas to research on these issues, PALE format moves away from the classic 'mini-conferences' approach and follows the Learning Cafe methodology² to promote discussions on open issues regarding personalization in learning environments. Four Learning Café sessions are set up.

¹ <http://adenu.ia.uned.es/workshops/pale2014/>

² <http://adenu.ia.uned.es/workshops/pale2014/format.htm>

Each one consists of brief presentations of the key questions posed by two workshop papers and subsequent small group discussions with participants randomly grouped at tables. Each table is moderated by the presenter of the paper. In the middle of the session, participants change tables to move swap group discussions and thus, promote sharing of ideas among groups. In this way, participants attending the workshop benefit both from interactive presentations and constructive work.

The target audience of the workshop consists of researchers, developers, and users of personalized and adaptive learning environments. Additionally, the contributions of this workshop have also been disseminated in the Educational Data Mining community at the EDM 2014 conference, which took place on July 4th-7th, 2014 in London.

As a long-standing workshop series (for 4 years now, annually run at UMAP) PALE workshop has established itself as a mature channel for disseminating research ideas on learning environments' personalization. This would have not been possible without the very much appreciated involvement of the program committee members (many of them supporting PALE all along these years) as well as the active participation of authors who have selected this venue to disseminate and discuss their research. As a way to compile the progress achieved in this field, a special issue on User modeling to Support Personalization in Enhanced Educational Settings is being guest edited by PALE organizers in the International Journal of Artificial Intelligence in Education³. Papers from PALE editions that presented ideas that have already produced relevant findings have been selected and invited to contribute an extended version of their papers for this special issue. The review process established by the journal is followed to assure that papers finally accepted meet the journal's quality standards.

In the following, we introduce PALE 2014 motivation and themes and present an overview of the contributions accepted and discussed in the workshop.

2 Motivation and Workshop Themes

Personalization is crucial to foster effective, active, efficient, and satisfactory learning, especially in informal learning scenarios that are being demanded in lifelong learning settings, with more control on the learner side and more sensitivity towards context. Personalization of learning environments is a long-term research area, which evolves as new technological innovations appear.

Previous PALE editions have shown several important issues in this field, such as behavior and embodiment of pedagogic agents, suitable support of self-regulated learning, appropriate balance between learner control and expert guidance, design of personal learning environments, contextual recommendations at various levels of the learning process, tracking affective states of learners, harmonization of educational and technological standards, processing big data for learning purposes, predicting student outcomes, adaptive learning assessment, and evaluation of personalized learning solutions.

³ <http://ijaied.org/journal/cfp/>

From the past experience, we have identified new research areas of interest in this field to complement the previous ones. Nowadays there are new opportunities for building interoperable personalized learning solutions that consider a wider range of learner situations and interaction features (in terms of physiological and context sensors). However, in the current state of the art it is not clear how this enhanced interaction can be supported in a way that positively impacts on the learning process. In this context, suitable user modeling is needed to understand the current needs of learners. There are still open issues in this area, which refer to providing open learner models in terms of standards that cover the extended range of available features and allow for interoperability with external learning services as well as taking advantage of the integration of ambient intelligence devices to gather information about the learner interaction in a wider range of learning settings than the classical desktop computer approach.

Therefore, other related topics are to be considered in the learner modeling, including affective states of the learner, changing situations in terms of context, learners' needs and their behavior. Another broad research area addresses personalization strategies and techniques, considering not only the learner model, but the whole context of the learning experience, including the various technological devices that are available in the particular situation.

In this workshop edition we raise the attention to share and discuss the current research on how user modeling and associated artificial intelligent techniques provide personalization support in a wide range of learning environments, which are increasingly more sensitive to learners and their context, such as: intelligent tutoring systems, learning management systems, personal learning environments, serious games, agent-based learning environments and others. We are especially interested in the enhanced sensitivity towards learners' interactions (e.g., sensor detection of affect in context) and technological deployment (including web, mobiles, tablets, tabletops), and how can this wide range of situations and features impact on modeling the learner interaction and context. Furthermore, we aim to cover the every time more demanding need of personalized learning in massive open online courses (MOOCs).

The higher-level research question addressed in this workshop edition is: "Which approaches can be followed to personalize learning environments?" It is considered in various contexts of interactive, personal, and inclusive learning environments. The topics of the workshop included (but were not limited to) the following:

- Affective computing
- Ambient intelligence
- Personalization of MOOCs
- Learner and context awareness
- Social and educational issues to be addressed
- Open-corpus educational systems
- Adaptive mobile learning
- Successful methods and techniques
- Reusability, interoperability, scalability
- Evaluation of adaptive learning environments

3 Contributions

A blind peer-reviewed process has been carried out to select the workshop papers. Three members of the Program Committee with expertise in the area have reviewed each paper. As a result, 8 submissions (out of 10) were accepted, which discuss ideas and progress on several interesting topics: modeling issues such as student's performance, user's profile management in a standardize way (i.e., IMS-LIP), taking care of learner's attributes such as reputation and mind wandering, detecting affective states to improve the personalized support, and applying user modeling in new contexts, such as MOOCs and gamified environments.

Khajah et al. [1] present a unified view of two complementary models of student performance, the Item Response Theory, which allows modeling different student abilities and problem difficulties, and the Knowledge Tracing, which captures skill acquisition and evaluate both models under a common evaluation metric. Results show that both models are equivalent and only differ in their training procedure.

Sawadogo et al. [2] focus on user assistance in an interactive and adaptive system. They proposed a modeling of a scientific user who is a researcher in a personal resource management system. The presented approach assists the users in the consolidated management of their resources and their environment, based on the user's profile. The methodology is based on the IMS-LIP standard extension and the user's trace management.

Lobo et al. [3] introduce how to compute a transferable and domain-independent reputation indicator to support the collaborative behavior and encourage the motivation of students in collaborative learning environments that considers the information extracted from social network analysis, statistical indicators, and opinions received by students in terms of ratings.

Bixler et al. [4] present a proactive personalized learning environment in which learners are provided with materials that would potentially reduce the propensity to mind wander during learning by optimizing learning conditions (e.g., text difficulty and value) for individual learners, and evaluate the performance of such a system by comparing the proposed method to two non-adaptive alternatives.

Arevalillo-Herráez et al. [5] present an intelligent tutoring system that adapts hints for learners to the line of reasoning (i.e. solution scheme) the student is currently following, and discuss some extensions to build a model of the student's most relevant skills aimed at providing a closer behavior to a human expert, by considering both previous interactions and the learner's affective state.

Ocuppaugh et al. [6] propose an extension of the BROMP field observation protocol to take into account behaviors and affective states not previously established during observations of educational multi-user virtual environments, such as disgust and creative meta-narrative. This protocol is used to collect ground truth data for sensor-free models of affect and behavior and to study student engagement in learning environments. The disgust and creative meta-narrative constructs considered in this contribution are not typically coded during field observations of educational software, but they may prove important as virtual worlds are used for educational instruction.

Henning et al. [7] discuss educational and technical challenges for the usage of MOOCs in higher education. In particular, how to make MOOCs more suitable for a greater variability of learning needs by semantically annotating their parts and running them in a semantically enhanced learning platform that provides personalized learning pathways for each learner through didactically meaningful learning object recommendations.

Tang and Kay [8] present their ideas and guidelines for applying gamification as meta-cognitive scaffolds in open learning environments such as MOOCs, and illustrate this approach through examples of how the guidelines can be applied.

4 Conclusions

In this 4th edition of PALE contributions have addressed some of the gaps identified in the state of the art, such as providing open learner models in terms of standards, the modeling of learners' affective and mental states, and the personalization support in new contexts, such as MOOCs and gamified environments.

Nevertheless, other issues remain open such as the integration of ambient intelligence devices to gather information about the learner interaction in a wider range of learning settings than the classical desktop computer approach, aimed to enhance the sensitivity towards learners' interactions through diverse technological deployments (including web, mobiles, tablets, tabletops), impacting on modeling the learner interaction and context. We expect that future editions in PALE can progress on this direction.

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