Toward Modeling the Learner’s Personality Using Educational Games

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ABSTRACT

Learner modeling is a crucial step in the learning personalization process. It allows taking into consideration the learner’s profile to make the learning process more efficient. Most studies refer to an explicit method, namely questionnaire, to model learners. Questionnaires are time consuming and may not be motivating for learners. Thus, this paper presents a new approach for Modeling the learner’s Personality, introvert/extrovert, using Educational Games (MoPEG). The proposed approach includes three phases, namely design of the educational game, collection of traces and personality prediction. To evaluate the efficiency of MoPEG, an experiment was conducted with thirty learners where their personality modeling results using MoPEG are compared to the Big Five Inventory (BFI) questionnaire. The obtained results showed that the accuracy level of MoPEG is significant with an 80% of similarity. Besides, based on the Kappa method, used by psychologists to measure the similarity of two instruments. The obtained results highlighted an agreement degree of MoPEG with the level “good”.

KEYWORDS

Classification, Educational Game, Game Interaction, Implicit Assessment, Learner Model, Learner Profile, Learner’s Personality, Validation

1. INTRODUCTION

Many methods are used in universities to gather information about learners in order to model them. These methods can be classified into two categories, namely explicit and implicit. In the first category, the collection of information is done in a direct and obvious way (i.e. the learners already know that the instructor is assessing and collecting information about them). This could be done using questionnaires (Dwi and Ari, 2012; Pourabdollahian et al., 2012). For instance, Soffano, Connolly, & Hainey (2015) used Felder-Silverman questionnaire to model the learners’ learning styles in order to investigate the changes of learning styles in a game-based learning environment. Questionnaires usually present statements that define individuals. The individual has to select the answer or statement that best describes his/her qualities or characteristics. However, individuals can have low self-knowledge, which may not allow them to answer the questionnaire correctly (McDonald, 2008). Besides, questionnaires

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are typically too long and can make individuals stressed and unmotivated. Moreover, questionnaires may not be the best method to ask people about themselves, since people try to respond in a fashion that they perceive as being more acceptable, when they feel they are assessed by others (Okada and Oltmanns, 2009). In the second category, the collection of information is done in an indirect way (i.e. the process of collecting information is done in the background and the learner is unaware of this activity). In this case, information is collected from the learners’ traces in e-learning environments (Campos et al., 2012; Romero and Ventura, 2006). These traces can be the time spent interacting with the learning content or the number of clicks. For example, the traces of learners’ browsing behaviors within a web-based learning environment are collected to model their cognitive styles (Lo, Chan, & Yeh, 2012). They are also used, in (Khribi et al., 2009), to personalize the learning content while learning. According to Pablo et al. (2009), e-learning systems may present the learning content in a passive form (i.e. only few clicks) which can generate inaccurate learners’ traces. Consequently, someone may ask if the learners really read the displayed learning content or not (Pablo et al., 2009).

Educational games, on the other hand, are highly interactive, present the learning content in a very interactive way and keep learners motivated (Pablo et al., 2009; Prensky, 2005). This allows using the generated traces during the learning-playing process to model and assess learners (Loh, 2007).

The collected set of information regarding learners (through implicit or explicit method) is represented as personalization parameters (Essalmi et al., 2015) which will be used to serve as a personalized learning experience. One of these parameters is the learner’s personality (Tlili, Essalmi & Jemni, 2016). Various research work have reported the importance of personality in learning environments. For example, Arockiam and Charles (2013) highlighted the importance of taking into consideration the learner’s personality while designing e-learning interfaces. El Bachari et al. (2010) recommended taking into consideration the learner’s personality while assigning to him/her a learning approach. Vasileva-Stojanovska et al. (2015), Caspi et al. (2006) and Pawlowska et al. (2014) demonstrated a correlation between respectively the learner’s personality and his/her learning outcomes, academic performances and satisfaction. Patrick (2011) stated that learners’ evaluation of teaching methods can be affected by the instructor’s personality.

This paper focuses on the use of educational games for modeling the learner’s personality to be distinguished on an introvert/extrovert dimension. Research work which have reported the use of the learners’ traces in an educational game, while learning-playing, to model implicitly their personalities are very scarce. Therefore, the main research question to answer is: How to model the learners’ personalities implicitly based on their behaviors while using computer educational games? In this context, this paper presents a new approach for Modeling the learner’s Personality using an Educational game (MoPEG). MoPEG includes three phases, namely design of the educational game, collection of traces and personality prediction.

The rest of the paper explores the above proposed research question as follows: Section 2 presents related work about learner modeling using educational games. It also presents the features that characterize introvert/extrovert learners. Section 3 presents the MoPEG approach. Section 4 presents a case study of the MoPEG approach. Section 5 presents the conducted experiment to evaluate MoPEG. Section 6 concludes the paper with a summary of the findings and potential research directions.

2. LITERATURE REVIEW

The use of educational games to model learners is gaining an increasing attention from researchers and practitioners. This section lists examples of educational games used to model learners. Besides, it investigates the features of both introvert and extrovert personalities.

2.1. Educational Games for Learner Modelling

Games are usually designed for fun and pleasure. Recently, their main goal has evolved to be used in the educational field as well, where they are designed with a particular pedagogical objective. Consequently, learners get to learn while playing. In particular, few of these educational games are
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