



Full length article

A fuzzy cognitive map model to calculate a user's desirability based on personality in e-learning environments

Somayeh Fatahi ^a, Hadi Moradi ^{a, b, *}^a School of Electrical & Computer Engineering, College of Engineering, University of Tehran, Tehran, Iran^b Intelligent Systems Research Institute, SKKU, South Korea

ARTICLE INFO

Article history:

Received 16 February 2016

Received in revised form

1 May 2016

Accepted 13 May 2016

Keywords:

Personality

Emotion

User's status

Desirability

E-learning

ABSTRACT

The recent research in artificial intelligence shows an increasing interest in the modeling of human behavior factors such as personality, mood, and emotion for developing human-friendly systems. That is why there is an interest in developing models and algorithms to determine a human's emotions while interacting with a system to improve the quality of the interaction. In this paper, we propose a computational model to calculate a user's desirability based on personality in e-learning environments. The desirability is one of the most important variables in determining a user's emotions. The model receives several e-learning environmental events and predicts the desirability of the events based on the user's personality and his/her goals. The proposed model has been evaluated in a simulated and real e-learning environment. The results show that the model formulates the relationship between personality and emotions with high accuracy.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

One of the goals of cognitive modeling is to simulate human problem solving and processing mental tasks in a computerized model (Sun, 2008). Such a model would be used to predict human behaviors or perform similar to humans. Thus, cognitive modeling can help researchers to design user interfaces which can understand users' needs and react to them accordingly (Trabelsi & Frasson, 2010).

Interest in simulating human behavior factors such as personality, mood, and emotion in virtual environments has been growing in recent years (Harley et al., 2016; Kazemifard, Ghasem-Aghaee, & Ören, 2011; Luse, McElroy, Townsend, & DeMarie, 2013). Several studies have been carried out to consider human behavior factors in human computer interaction (Egges, Kshirsagar, & Magnenat-Thalmann, 2004; Moshkina, 2006; Santos, Marreiros, Ramos, Neves, & Bulas-Cruz, 2011).

On the other hand, access to the web and the general use of computers have created several opportunities for e-learning systems, such as fully online and blended learning systems (Latham, Crockett, McLean, & Edmonds, 2012). E-learning environments, like all other tools, offer advantages such as access to different

online resources, self-directed learning, and self-paced learning. Despite all the advantages, this kind of learning environment lacks the necessary attractiveness and the dynamic characteristic of the face-to-face learning setups (Akkoyunlu & Soylu, 2006; Arkorful & Abaidoo, 2015). That is why, in the literature there are studies which tried to model emotion and personality in e-learning environments to mimic the face-to-face learning setup (Conati & Zhou, 2002; Fatahi & Ghasem-Aghaee, 2010; Latham et al., 2012).

Despite all these efforts, to the best of our knowledge, there is no work modeling the relationship between personality and emotion to improve the e-learning experience. Consequently, we have proposed a model to show a relationship between personality and one of the most important variables in determining emotions called desirability. The proposed model is able to predict the level of desirability variable in e-learning environments based on users' goals and personality. In this research, we used Myers-Briggs Type Indicator (MBTI) for personality modeling and the Ortony, Clore and Collins (OCC) model for emotion modeling. The results show the effectiveness of the proposed approach.

2. Psychological principles

In this section, the basic needed psychological terms, i.e. emotion and personality, are presented to ease further discussions in the upcoming sections.

* Corresponding author. School of Electrical & Computer Engineering, University of Tehran, Tehran, Iran.

E-mail addresses: s.fatahi@ut.ac.ir (S. Fatahi), moradih@ut.ac.ir (H. Moradi).

2.1. Emotion

Many studies have proven that emotions affect reasoning, memorizing, learning, working memory, and decision-making (Blanchette & Richards, 2010; Osaka, Yaoi, Minamoto, & Osaka, 2013; Paulus & Angela, 2012). Also, these studies have shown that the learner's emotional state influences his/her performance and it is an important factor in learning environments and should be considered in learner modeling (Kim & Pekrun, 2014). Thus, many psychological models for emotion modeling in computer science have been proposed (Marsella, Gratch, & Petta, 2010; Rodriguez, Ramos, & Wang, 2011). One of the most well-known of these models is the OCC model (Ortony, Clore, & Collins, 1990).

2.1.1. OCC model

The OCC model considers emotions to arise from affective or valenced reactions subsequent to the appraisal of a stimulus as being beneficial or harmful to one's concern (Ortony et al., 1990).

A person could alternatively have three types of focus which are consequence of events, actions of people, and aspects of objects (Fig. 1). The first type of emotions includes emotions which are consequences of the events that have occurred. These consequences are obtained according to the desirability or undesirability level of the events and the person's goals. The second type includes the emotions that are results of the person's actions based on approving or disapproving relative to a set of standards. The third type consists of emotions that are the consequences of the person's liking or disliking aspects of objects.

The OCC model calculates intensity of emotions based on a set of variables. The variables are divided into two groups: global and local. One of the most important variables to calculate the first branch of emotions is desirability. In this research, the OCC model is used and we try to calculate desirability variable based on finding its relationship with personality dimensions.

It should be mentioned that the OCC model has some advantages and disadvantages. It is a computational model and it has been implemented numerous times in artificial intelligence studies.

The disadvantages of the OCC model are that abstract evaluative criteria (Vallverdu, 2015) and only considered the emotion's cognition factor, but did not consider emotion's non-cognitive factor, such as the character's influence (Xiao, Ding, & Liu, 2014).

2.2. Personality

Personality comprises thoughts, feelings, desires, and behavioral tendencies that exist in every person (Hartmann, 2006) and have been presented from different views by psychologists (Schultz & Schultz, 2016).

Carl Jung believed personality consists of independent substructures that influence each other. He introduced the substructure which includes personal, unconscious, and the collective unconscious (Schultz & Schultz, 2016). Jung's type theory specifies three dimensions: Extroversion/Introversion (E/I); Sensing/iNtuitive (S/N) and Thinking/Feeling (T/F).

In 1920, Kathrin Briggs and Isabel Myers Briggs (Schultz & Schultz, 2016) added another dimension, i.e. Judging/Perceiving (J/P) (Pittenger, 1993), to Jung's typological model and presented the MBTI personality model. Fig. 2 shows the four dimensions of MBTI.

Sixteen personality types result from mixing the extremes of the four dimensions (Fig. 3). For example, individuals in ESTJ group are Extrovert, Sensing, Thinking, and Judging.

It should be noted that MBTI is one of the best-known tool that has been used to determine personality. According to the Center for Applications of Psychological Type, MBTI is the most commonly used personality inventory in history; approximately 2,000,000 people use MBTI for their personality detection every year. Moreover, the validity of the MBTI model has been widely recognized (Kim, Lee, & Ryu, 2013).

Also, MBTI is one of the most popular method to specify the learning style in learning environments especially in E-learning environments (Hall & Moseley, 2005; Haron & Salim, 2006; Niesler & Wydmuch, 2009). Consequently, in the proposed model in this research, we have chosen MBTI for personality modeling.

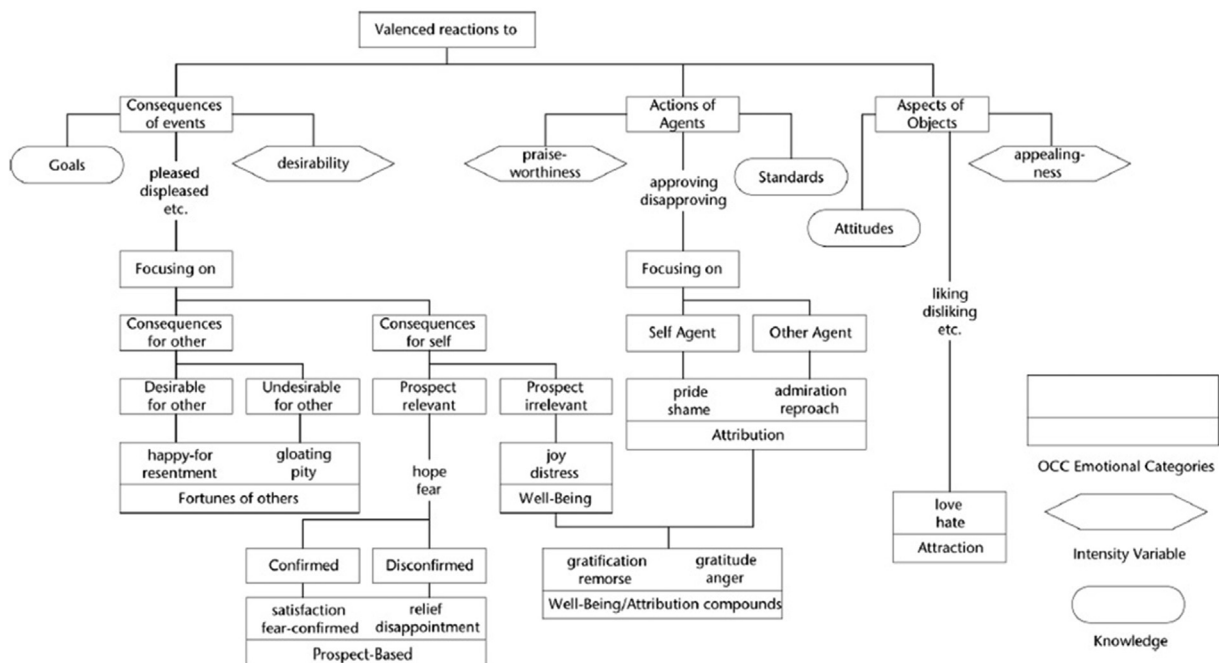


Fig. 1. The OCC model (Ortony et al., 1990).

Download English Version:

<https://daneshyari.com/en/article/6836637>

Download Persian Version:

<https://daneshyari.com/article/6836637>

[Daneshyari.com](https://daneshyari.com)