Cultural Situation Awareness in e-Learning Systems

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Abstract

Culture heavily influences the ways we think and act. In a globalized world, the underestimation of cultural factors can lead to serious consequences. In educational courses involving students from all over the world, it is important to consider cultural differences. Having high levels of Cultural Situation Awareness is therefore fundamental for both teachers and students. In this work, we propose an approach to build and maintain Cultural Situation Awareness in an adaptive e-learning system.

Keywords

Situation Identification, Fuzzy Cognitive Map, Self-regulated Learning, Learning Management System

1. Introduction

The COVID-19 pandemic forced many schools and universities all around the world to adopt online learning, in different forms, to continue their educational activities, trying to minimize as much as possible the interruption due to the social distancing imposed by the governments to face the coronavirus. The transition to online learning for many universities has not been without difficulties and challenges, both from the technological and the pedagogic viewpoints. Several forms of distance learning have been used, ranging from completely asynchronous approaches with prerecorded lessons and educational materials wherein students should self study, to synchronous online learning in which face to face lectures are given by the teacher to a virtual class via videoconferencing systems. Hybrid approaches have been often adopted, which can be referred to as blended learning. This trend promotes the presence of students from different cultures in the same classroom (physical or virtual). If on one hand the presence of different cultures is a great enrichment for the students and the society, on the other hand, it demands great attention by the teachers (especially in face-to-face lectures) that should provide learning contents suitable for different cultures. This is not only to respect the different cultures but especially because it has been demonstrated that culture has an impact on the way we learn, communicate, and think. Therefore, to deliver an effective lecture for all the students, the teacher should pose attention to cultural differences. In this work, we propose an approach to support both students and teachers in the understanding of the cultural differences while enjoying or delivering learning content in a blended learning setting, by fostering the building and maintaining of what is called Cultural Situation Awareness (CSA).

2. Cultural Situation Awareness

Situation Awareness (SA) has been defined by Endsley as the perception of the elements in the environment within a volume of time and space (SA Level 1), the comprehension of their meaning (SA Level 2) and the projection of their status in the near future (SA Level 3) [1]. SA is a crucial construct in decision making and in the management of operations in many large complex system, having a dramatic impact on human decision making and human performance in tasks that require complex cognitive efforts [2]. More recently, Endsley drew attention to the importance of cultural aspects during the process of SA acquisition and retention [3]. For some kinds of tasks, like for military operations, the understanding of the cultural aspects of the involved people is critical to successfully complete the desired task. Therefore, according to Endsley, we can define Cultural Situation Awareness (CSA) as an integral component of the human's overall SA, related to the cultural factors which comprehend the set of shared values, beliefs, attitudes, norms characterizing a specific group of people. According to Bodley [4], culture involves what people think, what they do, and the products (material and immaterial) they produce. Culture influences members of a society by shaping their values, perceptions and behaviors [5].

Several works studied the impact of the presence of students from different cultures in a course and the effect of cross-cultural teaching [5, 6, 7]. In particular,

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according to [8], underestimating the culture's role in e-Learning may lead to misunderstanding learners' reactions to different kinds of stimuli, which could lead to an error of adaptation to the learners' needs. In the context of online learning and blended learning, having a good level of CSA for teachers requires: i) at SA Level 1, the perception of cultural cues, human behavior's aspect and cultural facts and events; ii) at SA Level 2, the complex sociocultural relationships between individuals and the impact these could have on the learning processes and learning objectives should be identified; iii) at SA Level 3, the possible actions that the teacher would like to perform for interacting with the students should be analyzed according to the cultural situation of the classroom, and the potential effects of such actions should be evaluated in order for deciding which will be the best way to act.

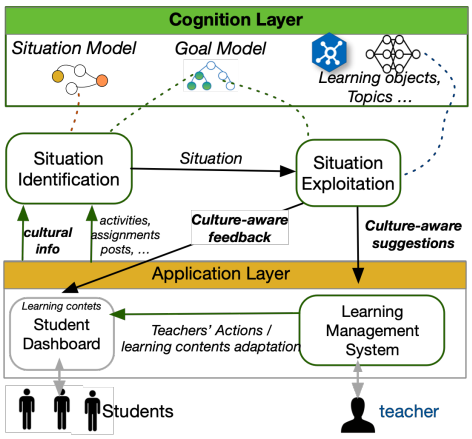

Figure 1: Goal-driven Cultural Situation Awareness for an Adaptive e-Learning system

3. Cultural Situation Awareness in an e-Learning system

In recent works [9, 10, 11], we have defined an Adaptive e-Learning system based on the SA paradigm and designed using the Goal-directed Task Analysis (GDTA) approach [12]. This system is able to recognize the situations involving the students by analyzing the activities the students perform using the system. The recognized situation, together with the goal of the student, is used to adapt the learning course in terms of learning contents, learning objectives, but also to adapt the interface and the overall user experience. Feedbacks are sent to both students and teachers to guide their activities according to the current situation and their active goals. In this work, we propose an extension of such system to support Cultural Situation Awareness, depicted in Figure 1. The students interact with the e-learning dashboard to follow the lectures, consult the learning and multimedia contents, collaborate with the other students using the social tools available in the platform, and so on. These activities produce data regarding the students and the learning progresses. Each student has a user profile, created during the registration in the e-learning system, which contains information on his/her background, geographical location, interests, and some cultural information. Notice that such information can also be inferred and updated by analyzing user behavior. This data represents the input of the situation identification module, whose task is to identify the cultural situation by analyzing the gathered data and by considering the active goal. All the possible goals identified in the GDTA and the related situations are modeled using ontologies [13] and are contained in the cognition layer. The situation can be identified using Fuzzy Cognitive Maps [9] or using semantic-based and rule-based approaches [14, 15, 16, 17]. The identified situation will be used by the situation exploitation module to adapt the application interface and in particular to provide teachers and students with recommendations and feedback suitable for the cultural situation [18, 19]. Moreover, the situation can be exploited also to: identify unsuitable learning contents for some cultures; draw the attention of the teacher to gender issues; propose a team-working activity rather than an individual task; suggest a more formal style instead of an informal one; and so on. The teacher could use these suggestions for adapting the teaching style and the learning contents. Let us consider the following scenario to demonstrate how the proposed approach works. A teacher is giving her lecture for the course on Algorithms and Data Structures at a Bachelor's Degree in Computer Science in an Italian university, using the Adaptive e-Learning System, to a virtual classroom due to the restrictions for containing the Covid-19 pandemic imposed by the Italian Government. The lecture is given using a videoconferencing system embedded in the proposed e-Learning system. The classroom is essentially composed of Italian students, but recently two Chinese students have joined the course remotely. The teacher gave the same courses in previous years only to Italian students and she usually has an amicable and colloquial style to facilitate the interactions with the classroom. However, in this new situation, the system identifies the fact that Chinese students are in the classroom, and continuously suggest the teacher preferring a more formal style to avoid foreign student perceive the teaching style as

rude. Moreover, the system suggests the teacher asking rapid questions to the two students during the lecture. Indeed, in Chinese culture, students rarely ask questions to the teacher by themselves since this is often considered as a challenge to the teacher, while usually is the teacher to ask questions to the Chinese students to foster the discussion [20]. This simple example scenario shows which kind of adaptive behaviors can be embedded in the system, using FCMs and goal-driven modeling, taking into account the role of Cultural Situation Awareness.

4. Conclusion

In this work, cultural situation awareness has been applied to e-learning and embedded in a goal-driven adaptive e-learning system. In future works, the approach will be evaluated in real-world scenarios.

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