

On the Definition and Management of Cultural Groups of e-Learners

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Abstract. One objective of our ongoing research is to be able to culturally adapt e-Learning. This paper is focused on describing a methodology to represent cultural groups of learners and adapt the learning session depending on the membership of learners to one or more cultural group.

1 Introduction

One of the main consequences of globalization in the domain of information is that individuals all over the globe have access to the same global media. However, it is perceived differently depending on the local culture. The important interconnection of the local and global is to be considered cautiously insofar that it generates cultural hybridization from which emerge new cultures [1]. E-learning with the use of Intelligent Tutoring Systems is no exception for it has become a global methodology with the use of Internet. This leads to two major conclusions. First, an ITS, in order to be trustworthy, must provide a response to this local sensibility. Second, since most cultural groups are the fruit of the hybridization of a certain number of cultures, an ITS must stay aware of those cross-cultural relationships. In this paper, we extend a previous work concerning a rules-based methodology to culturally adapt the response of eLearning systems and ITS [2]. We explain how we create the basic cultural groups that are needed in our methodology, how we translate cultural information into usable data for learning decisions. Finally we discuss issues associated with the deployment of a culturally aware system.

2 Reminder on a Process for Cultural Adaptation

Many elements related to the ITS field are obviously culturally-dependant such as emotional management, choice of pedagogical strategies, meanings given to concepts and symbols, reward allocation, test anxiety or ways of motivating people.

Inspired by the concept of Cultural Intelligence [3], we believe that a Culturally AWAre System must have the ability for cultural *understanding* (i.e. culturally interpreting a learner's behavior/feeling/result) and *adaptation* (i.e. displaying different interfaces and/or starting different learning strategies depending on learners' culture).

In our previously proposed methodology for cultural adaptation [2], *Cultural rules* are deduced from the cross-cultural literature. For instance, we can use the *Hofstede's*

system of values [4] or *Schwartz's Value Inventory* [5] which represent national cultures with a set of dimensions and associated scores. The system uses these data as Cultural Facts that initialize a rule-based system. This system is aimed at determining certainty weights of pedagogically-related attributes (for example the interest for collaboration). To summarize, a cultural group is described as a vector of weighted attributes that we call Rules Weights Vector (RWV). Each learner has a similar RWV that is initialized depending on his cultural profile. The membership of a learner to each cultural group (called Membership Score) is also determined using the normalized distance between the learner's RWV and the RWV of a given cultural group. During the learning process and depending on learners' successes/failures, the weights of learners' RWV evolve and they in turn affect groups' RWV and also all the membership scores. Finally, all pedagogical resources and strategies are dynamically rated in order to represent the interest to use them with learners of a given cultural group. When a learner needs to learn some concept, pedagogical resources and strategies will be selected depending on the membership score of this learner to different cultural groups.

3 Creation and Management of Cultural Rules

The purpose of our system is to select an appropriate tutoring strategy, resource or behavior of a pedagogical agent according to a learner's cultural profile. That goal is reached through a process subdivided in three levels of decision as shown in figure 1.

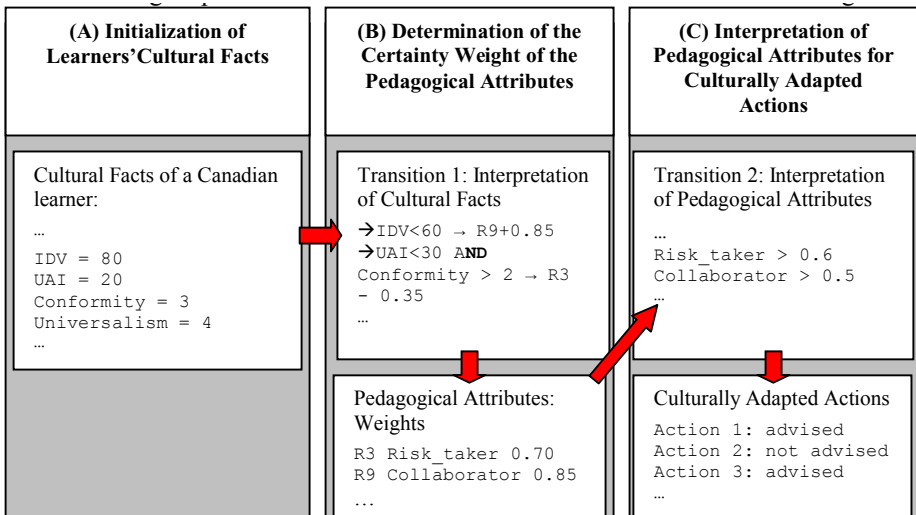


Fig. 1. The decision process for a Canadian Learner (IDV, UAI, Conformity and Universalism are cultural dimensions taken from [4] and [5])

First, the system reads the information submitted by the learner through a culturally focused questionnaire. *Cultural Facts (A)* are then deduced according to the cultural groups the learner has been determined to belong to. For instance the cultural facts can be values associated with Hofstede's national culture dimensions like IDV (Individualism) or UAI (Uncertainty avoidance).

Then, *Cultural Facts* are transformed into information usable for pedagogical decisions (**B**). Those are properties describing the learner, coupled with weights that indicate the degree of his relation to the property. For instance in figure 1, the "collaborator" attribute illustrates that the probability the learner should like to work with other learners is 85%. The weights are increased or decreased using *Cultural Facts* as inputs for predicates in a rules engine.

Finally, the system interprets pedagogical attributes to determine which pedagogical actions are culturally suitable (**C**). In fact the system selects *Culturally Adapted Actions* according to the weights of pedagogical attributes. For instance, depending of the weight of the learner's "collaborator" attribute, the system selects either a collaborative task or a self-oriented scenario to present the learning content.

To facilitate the process of description of cultural groups, we implemented a tool to create new cultural groups from scratch by attributing scores to cultural facts. In this tool, we introduced a mechanism of *group inheritance*, which means that some groups are specialized groups of a broader one, or a combination of many groups.

4 Discussion on the Deployment of a Culturally Aware System with Large Scalability

In the face of a huge number of learners spread over the world, there are a few issues that must be considered in order to optimize the system's performances.

First issue: a dynamic update or RWV requires all learner profiles, and not only those currently logged into the system.

Second issue: since the cultural adaptation process is performed in real time, it would be more efficient to decentralize as much as possible the adaptation operations to lighten data traffic over the network and in order to respond quickly to changes in the profiles of learners as well as group.

The GRID topology appears to be an interesting way of meeting both these needs but further researches in order to integrate it in our system need to be done.

5 Conclusion

In this paper, we presented an approach to make ITS culturally aware. We described a rule-based decision process based on cultural facts obtained from the cross-cultural research field to allow cultural adaptation in ITS. Culture has a great importance on the way people behave and understand their environments and we believe that dealing with culture is a very promising research avenue.

References

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