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A model of tutor agent in collaborative e-learning environment

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ABSTRACT

A collaborative e-learning environment is made up of participants that are remotely placed, who for their diverse social or geographical reasons could not be able to attain their educational goals in the same physical environment. In such collaborating environments, students need to interact and communicate with each other, share their common experiences and solve common problems. This may sometimes results to many collaboration conflicts that may require the intervention by a teacher. Managing such web integrated environments by a human teacher will no doubt be tedious, less efficient and at the same time consuming. The aim of this paper is to introduce a multi-agent approach to model the tutor component by substituting the human teacher with an intelligent tutor agent in order to improve the supervision and mediation against collaboration conflicts tasks of the teacher in such environment.

Keywords: Tutor agent, ITS, e-learning

Collaborative

1. INTRODUCTION

Integrating intelligent agents into e-learning environments characterized with students collaboration may be a very good step towards increasing the efficiency and the speed at which each ITS component or model perform its functionality in the system. In this kind of environment, students are equipped with the right instruments that will allow them to work together to achieve a common objective as students are free to express and communicate with each other (Casamayors, Amandi, & Campo 2009). For learning in a collaborative environment to be effective, there should be a constant supervision on how the students are collaborating. This supervision can produce positive effects to both the students who can benefit through keeping record of what has been established or what needs to be further revised and the tutors too who through the supervision can also figure out the strengths and weakness of the instructional design or the learning environment so that they can adjust the learning process promptly for unexpected needs or improve the curriculum further in the future (Pozzi et al., 2007). Moreover, supervising the collaboration can also assist the tutors to keep track on students' on-going activities in order to overcome any threat that may leads to failure. Teachers need to gather and analyze data continuously to keep the learning process under control. They must ensure the learning process is going on smoothly and proper decisions are made when needed.

Collaborative environments can be created by integrating a variety of tutoring tools, hardware and software components of a computer at various levels of collaborations such as: collaborations at the computers; collaborations

around computers; collaborations related to computer applications; collaborations via computers. The first three scenarios defines a physical setting were the collaborating partners sits in the same physical environment and are capable of communicating through spoken or written languages. Thus, the role of computers are in those situations is more towards mediation in collaboration and also serve as referential anchor. Collaborations via computers can be achieved in situations where for diverse factors the collaborating teams are situated at various locations but are connected to each other through a common network that may provide the opportunities to share and exchange their common knowledge and generally, the interaction through computers has to be guided and be intervened by a tutor or a group of tutors (Gorghiu, Lindfors & Hamalainen 2011).

The success recorded in the advancement of Computer Supported Cooperative Work (CSCW) made it possible to invent a modern system of collaborative learning called Computer-Supported Collaborative Learning (CSCL); (Zurita & Nussbaum, 2004). Generally, collaborative learning environment is an interactive forum that involves groups of learners and tutors, in which participants acquire and share ideas and knowledge.

Monitoring the collaborating teams in such environments is very vital in computer-supported collaborative learning (CSCL) (Wang, 2009). Putting students in groups and asking them to perform a given activity together does not mean collaboration will naturally happen (Johnson & Johnson, 1994). It is important that the participants come together as a team and are effectively supervised in order to ensure that each member contributes to the success of the whole exercise.

2. RELATED LITERATURE

2.1 Origin of Collaborative Learning

The history of collaborative learning as an instructional technique can be dated back to ancient civilizations. However it wasn't until the middle of the 20th century that learning in collaborative environments gained a life line when researchers found out that student tends to learn fast when they work as a team in the process of teaching and leaning rather than making the whole activities just as teacher centered (Banerjee,2012). The domain of collaborative learning is a personal philosophy, not just a classroom technique. A fact to remember is that when people come together to work as a team, there has to be a way of controlling their activities, there is need for sharing of common roles and ability to embrace responsibilities within the members for the group actions. For a success to be achieved in a collaborative learning environment, the environment has to be built on the principle of working together as a team, contrary to competition in which individuals best other team members.

Computer-supported collaborative learning (CSCL) is an emerging branch of the learning sciences concerned with finding out how students can learn collectively with the help of computers. CSCL is closely related with education, it takes into accounts all the stages of formal education from kindergarten through graduate study as well as informal education, such as museums. Computers have become so vital in the sense that educational authorities and leaders globally try to increase student access to computers and the internet. The idea of motivating learners to come together in small groups has also become increasingly emphasized in the broader learning sciences (Stahl, Koschmann & Suthers, 2006).

2.2 State of the Art

Various e-learning platforms have being developed already for example SAVER (Casamayor, Amandi, & Campo 2009). Other systems similar to this are OSCAR(Latham, Crocket, Mclean, Edmonds, 2011), PAMS 2.0(Y.S Su, Yang, Hwang & Zhang, 2010), ALFANET(Olga, Rodríguez, Gaudioso & Boticario, 2003).

2.3 ITS Structure

A standard ITS architecture is made up of four basic components that includes: the domain model, the tutor model, the student model as well as the user interface model (Nkambou, 2010). The domain model retains knowledge applicable to the course contents. The intelligent tutoring systems make use of the domain knowledge for reasoning and finding solutions to the domain problems, or to addresses any query from the students. The tutor model represents the knowledge required to achieve the objectives of the teaching. It is usually characterized by having: control over the order and selection of course material to be presented to the student; response methods to address queries from the students; questions with suitable answers; knowledge of when the students need some assistance in the course of conducting an exercise or learning a skill and deciding the kind of assistance to be rendered. In order to attain these goals, the tutoring model needs to familiar with various instructional styles. The student model holds the learner's embraced knowledge and skills. Records such as learning preferences, previous knowledge and advancement can equally be useful in choosing the best teaching strategy. Information about learner's mistakes and misconceptions can also be recorded in order to analyze the student behavior. The interface model responsible for communication and which includes a mechanism of selection for tutor agent (supervisor) (Padayachee, 2002).

3. Proposed Architecture

Our proposed architecture is aimed at improving the tutor model. The idea is, replacing the roles of the human teacher with an intelligent agent is expected to improve the efficiency and the speed of the system. The generalized three tier architecture of the proposed system is represented in Fig1.

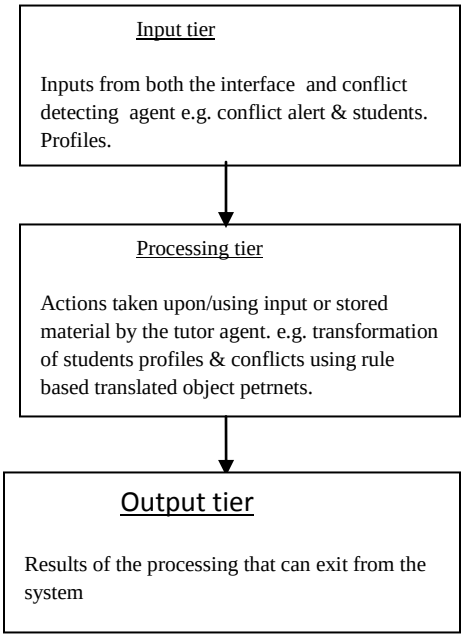

Fig.1. IPO model of the automated tutor agent

The promise of collaborative learning environments is to provide an opportunity to facilitate learning in relatively realistic, cognitively motivating, and socially enriched learning contexts. A fully integrated intelligent agent controlled environment may serve as a promising approach in realizing those goals. The primary aim of our proposed system is to introduce a multi agent architecture that integrates different formalisms in order to improve the teacher's tasks of supervising and at the same time intervening in collaboration conflicts. The table below gives a comparative

analysis of similar systems that are already in existence.

Table1. Comparison of four existing tools

Tool	Feature	Presence of agent	Remark
SAVER	Tutor Assistance Model	Semi-agent	Tries To Improve The Tutor Model Indirectly
PAM 2.0	Modeled the student component.	Non-Agent	Tries To Improve The student Model
OSCAR	Modeled the tutor component.	Semi-agent	Tries To Improve The Tutor Model Indirectly
ALFANET	Modeled the tutor component.	Semi-agent	Tries To Improve The Tutor Model Indirectly

5. CONCLUSIONS

Multi-Agent system (MAS) technique has provided a great help in improving the e-learning environments, because it helps in easing the modeling and structuring tasks through the distribution among many agents, the domain, students, interface as well as the tutor models. As further enhancements to this work, automating the domain or interface model will increase the efficiency and the speed of the system functionality.

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