Identifying Learner's Compatibility to enhanced e-Learning Contents using Agent

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ABSTRACT
E-learning gives an extensive improvement using World Wide Web for teaching and learning over the past few years. The main objective of this paper is to express the advantages of using intelligent system to provide familiar virtual environment for e-learning resources. In this paper an innovative platform has been proposed that integrates intelligent agent in e-learning environments. It utilizes a set of interacting agents that can personalize instruction based on an individual's prior knowledge and their learning needs. The agent monitors the e-learning environment and improves learning and provides an intelligent assessment service to computational intelligent using event based facts and rules. Here we proposed a learners' profile which will help to analyze the learners' characteristics emotions during learning, by which later on the e-learning contents may be improve for better tutorials.

Keywords
Agent, E-learning, Intelligent.

1. INTRODUCTION
Now a day's online learning has been increase by leaps and bound for number of students return to universities and colleges. The extensive acceptance of e-learning environments in all levels of individual education has leaded scientific research in the field of intelligent e-learning system in order to supply higher excellence service towards the end user of the e-learning system. The internet and multimedia technologies are reshaping the way of knowledge is delivered allowing e-learning to emerge as a solution the problem of life long. The basic different of e-learning content from other educational material is that it can be disassembled as individual learning objects ,tagged and stored for reuse in a variety of different learning framework. These learning objects can be assembled into different configurations depending upon the needs of individual educational situation.

The demanding needs of the e-learning users for personalization the adaptive and intelligent e- learning system is more than clear that convince the system. For example in e-buying people are eager to buy products or services that fit exactly to their personal needs and interests. For this reason the enormous technical attempt in all market sectors to set up skin tone in products or armed forces that convince the needs for personalization, which is same for e-learning system. Now a days the modern systems are domain specific or non adaptive and do not support learning objects reuse. This has accomplished in the search for open intelligent e-learning communications that can be used with customary web technologies. This paper present an intelligent web based educational system using multi agent system and web services. Agent has become popular addition to interactive learning environments. They can support the individual learners by personalized course materials based on learning objectives, learner characteristics and prior knowledge of learner. Indeed, the Internet and the advance of telecommunication technologies allow us to divide up and operate information in nearly real time. This reality is determining the next age band of distance education tools. Distance education arose from traditional education in order to cover the necessities of remote students and/or help the teaching-learning procedure, reinforcing or replacing traditional education. The Internet takes this process of delocalization of the educative familiarity to a new kingdom, where the lack of presentably communication is, at least moderately, replaced by an improved level of technology-mediated interface. In addition, telecommunications consent to this interaction to take forms that were not available to traditional presentably and distance learning teachers and learners. The agent based approach is suitable for at the bottom of web based education since relationships among learners, courses and instructors for a substantial period of time. The agents' capability to play a role of a personal assistant arises from its self-reliance, reactivity and pro-activity properties. Our proposal is to provide a scalable raised area where the agents are implemented in order to provide intelligent appraisal services based on computational techniques.

2. STUDENTS AND INTELLIGENT AGENTS
From a student perspective, a growing body of evidence indicates that the presence of intelligent agents is beneficial. Developing more human-like systems via intelligent agents makes users' interactions with the computer much smoother.' Moreno and colleagues" suggest that likable animated pedagogical agents may help students develop an emotional connection with the agent, facilitating their enjoyment of the learning situation. Along this line, the learner's development of a social relationship with a pedagogical agent is a key mechanism in fostering interaction and promoting learning within a computer-based learning system.' In the MIMIC (Multiple Intelligent Mentors Instructing Collaboratively) research project at Florida State University, Amy Baylor',' consistently found that undergraduate students responded favorably to pedagogical agents, available to assist them in a Web-based learning environment. Specifically, participants found the agents to be useful, credible, and worthy of their attention, and they internalized the agents' suggestions.

3. CLIPS OVERVIEW:

CLIPS(C- language Integrated Production System) expert systems may be executed in three ways: interactively using a simple, text-oriented, command prompt interface; interactively using a window/menu/mouse interface on certain machines; or as set in expert systems in which the user provides a main program and pedals execution of the expert system. Embedded applications are discussed in the Advanced Programming Guide. In addition, a series of commands can be routinely read directly from a file when CLIPS is first started or as the result of the group command. The basic CLIPS interface is a simple, interactive, text-oriented, command prompt interface for high portability. The usual usage is to create or edit a knowledge base using any standard text editor, save the knowledge base as one or more text files, exit the editor and execute CLIPS, then load the knowledge base into CLIPS. The interface provides commands for screening the existing state of the system, tracing execution, adding or removing information, and clearing CLIPS. The CLIPS architecture is designed to support manifold expert systems running at the same time as using a single CLIPS application engine. If numerous environments are created, a single thread of execution can be used to run each expert system. In this state of affairs, one setting must finish executing before control can be passed to a different environment. The user openly determines which environment should be executed by using the environment API to set the existing environment. Once execution of an API call for that environment begins, the user must wait for completion of the API call before transient control to another environment.

4. PROPOSED ARCHITECTURE

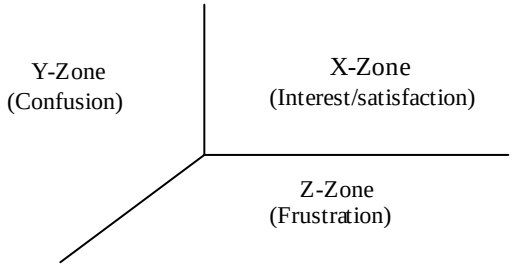

Figure 1: FCIS Model (Source: Author)

This paper also proposes a prototype of an affective e-Learning architecture model and algorithm that combines learner's emotions with the e-Learning platform. We have designed this FCIS model with respect to Russell's 'circumflex model' to describe user's emotion space and the Kort's 'learning spiral model' as the starting point to explore the affective evolution during learning. In our proposed architecture we focused on dimensional model instead of cognitive appraisal model for user emotion modeling. FCIS is a proposed three plane learning model (Figure 1) in which X-plane represents Interest/Satisfaction, Y-plane represents Confusion and Z-plane represents Frustration. By convention on the mouse movement rating which identify the learner present status in the plane. The objective of this FCIS model is to be aware of how learners' emotions change during learning process, so as to develop learning systems that are familiar with and act in response properly to their emotional changes. The basic set includes the most important and frequently occurred emotions during learning, namely, interest, confusion, frustration; satisfaction .They might not be exactly same for the all people. A registered user is experiencing positive affect and constructing knowledge at the beginning. At this point, the learner is working through the material with ease and has not experienced anything overly puzzling. Once discrepancies start to arise between the information and the learner's knowledge structure, he/she moves to Y-plane, which consists of confusion regarding the topics. As the learner tries to sort out the confusion but fails, he might move into Z-plane. This is the zone of unlearning and negative affect, when the learner experiences emotions such as frustration. The PAgent which monitor the mouse movement of a particular page to a selected chapter. This agent identifies the learner status among the three plane of the FCIS model. By convention we have consider 4 no of clicks per page per some unit of time is in the X-plane which is interest and satisfaction level of the learner. The mouse movement monitoring algorithm by the agent follows:

4.1 AlgorithmPAgent MouseMovement ()

```
if no_of_clicks > 4 then
    PAgent move to Z plane
else
    if no_of_clicks < 4 then
        PAgent move to Y plane
    else
        PAgent move to X plane
    EndIf
EndIf
```

From the above algorithm we are proposing that by convention if the no of clicks per page per unit of time increased more then 4 then the PAgent identifies the user in the Z plane which is frustration. If the no of clicks less then 4 then the PAgent moves to Y plane i.e confusion. Other then this the user will be remain in the X plane which deals with the materials with interest and satisfaction. When the PAgent identify the learners' zone at that time the PAgent retrieve the necessary resources which may help the learner for betterment. The resource retrieval algorithm by the PAgent as follows:

4.2Algorithm PAgent_Retrieval()

```
if PAgent in Y-plane then
  Retrieve references
else
  if PAgent in Z plane then
    Retrieve entertainment
  else
    Retrieve Exercise
  EndIf
EndIf
```

In this retrieval algorithm if the learner is in Y-plane (confusion) then the PAgent will give the references from the database for betterment, related to that confusional page. If he is in Z-plane(frustration) then the PAgent will bring entertaining information to the learner for a fresh start from X-plane as a good teacher is oftenly doing in the classroom . After the misconceptions are discarded, the learner moves into X-plane.

5. ARCHITECTURAL VIEW OF THE PROPOSED SYSTEM

To remain it effortless, our model built-in only a separation of the factors that could be taken into explanation to measure learner's emotional reactions in e-Learning. This model had the following major components:

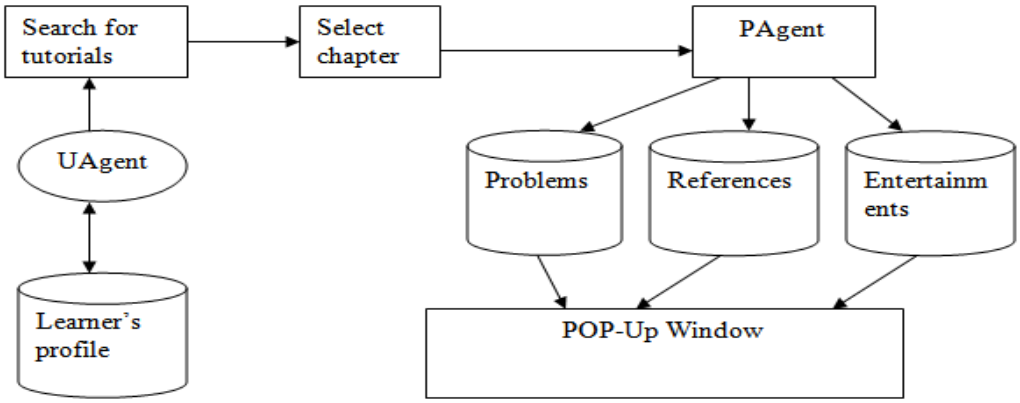

Figure 2. Architecture of proposed model

a. Learner Profile

Only two learner features were well thought-out in this model: learner preference and competency. Learner preference included learning content type, interactive type, learning habit etc. These factors were generated from multiple intelligence theory (Gardner, 1993),

which argues that people have differing analytic capabilities, some are good at mathematical equations, others prefer verbal descriptions, and others may prefer to manipulate graphical representations. Information about learner Preference was gathered through CLIPS technologies and learner surveys, and could also be modified by this learning model accordingly. Learner competency described learner's current knowledge structure, which would be used to compute the learning break between current and probable competencies. This gap analysis was used to recognize suitable learning content that could help the user development towards his objective.

b. Tutorials

The registered user will choose his desire topics from the tutorials.This part will enrich according to the learners' capabilities time by time.

c. PAgent

It is the most important agent in this architecture.It determines the learners' preferences and competency. According to the PAgent_MouseMovement algorithm it moves to the any plane of the FCIS model.

d. Databases

In this proposed architecture we have introduced four different databases namely PROBLEMS,REFERENCES,ENTERTAINMENT and LEARNER PROFILE. The PROBLEM database stores the assignments, excercise, puzzels respect to chapter wise. ENTERTAINMENT database will store the funny games; video tutorials.REFERENCE database will store all the references related to essential keywords of each and every page of all the chapters.

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e. UAgent

UAgent will keep track of all the records of the user quires in learner profile database such as users' tutorials, user emotions with respect to tutorials

6. WORK FLOW MODEL

For our study, we used Russell's 'circumplex model' to describe learner's emotions detected from biophysical signals, and used the Kort's 'learning spiral model' as the starting point to explore learners' emotional evolution during the learning process. Finally, based on our work we proposed a FCIS model of affective learning
focusing on how we could make use of the information when we have got the learner's emotion states and their evolution. This affective learning model considers the MOUSE MOVEMENT/CLICK information of the learner and the learning setting, and generates appropriate responses to the learner, based on his/her emotional states, and learning goals.
We have analyze the architecture in such a way that may help us to enrich the e-learning materials of the proposed system depending upon the learners profile. It provides general idea on multiple agent mechanism designed to achieve intelligent personalization. Agents include PAgent, User Agent. Each and every input given by the learners are track by the UAgent.These inputs are kept in learners
profile database. When a registered user looking for a particular chapter of a tutorial the PAgent automatically activated which track the Mouse movement of the user. The PAgent identifies the any three of the users' emotion from the FCIS model. Then the agent pop-up the required materials for the user. If the PAgent identifies the learner is in the X-zone then he pop-up the excercise, puzzels depending upon the chapter. If the learner in Y-zone then PAgent pop-up the reference tutorials related to special keyword of that chapter i.e stored in the reference database. And lastly if the PAgent finds the learner is in Z-zone then the funny topics will be pop-up for refreshing the learners mind. During this time the

UAgent automatically track the users behavior on the materials in the learners profile. Firstly, the learner log into the system. Then he Chooses his favorite subject from the tutorial. After that he chooses the chapter which he wants. After completion of selection process the PAgent start working. Based on the learners' selection the PAgent determine the current status of the learner. After that based on the mouse movement of the learner the PAgent keep track of the learner conditon.Here by convention we assumed that the time required for reading out a page 4minutes/page (300 words).If mouse_clicks < 4 then the learner will be in Y-plane that means in Confusion. If learner found in
confusion then PAgent will pop-up some references about the important keywords of that particular page from the REFERENCE database. If mouse movement > 4 then the learner will be in Z-plane that means in Frustration. If learner found in frustration then PAgent will pop-up some entertaining material such as video tutorial, games from the ENTERTAINMENT database. Other than this two condition the learner will fall into the X-plane, which is in satisfaction. That time the PAgent will pop-up some assignments, exercise from the PROBLEM database. The UAgent will keep track of all the activities about the learner and all the information will be stored in the LEARNER PROFILE database. Next time whenever the learner will log into the system all the events about the learner will be generated from the LERANER PROFILE database and the necessary material of that particular subject will be enrich or up to date day by day. Using clips we will keep the track of user's fact in learners' profile.

7. CONCLUSIONS AND FUTURE WORK

Using physiological signals to predict emotions, this study explored the emotion evolution during learning, and proposed an affective e-Learning model. While this study has generated encouraging results, it has some limitations. Following are the issues that should be addressed in future studies.

1. Learner's emotions are detected through mouse _clicks only. Future studies should use multi-modal pattern analysis of signals, from face, voice, body and learners' surroundings, to achieve more accurate results in emotion recognition.

2. In this study, the subject freely chose his learning content. To better explore emotion revolution during learning, researchers should design well-structured consistent lessons and materials focusing on learning a specific knowledge or course that can be used with more than one subject. In order to increase the reliability of results, future studies should also include a larger sample. At this exploratory stage, single-subject experiment is more feasible. The value of our work is to confirm a few general principles related to affective learning. And we anticipate a more systematic and in-depth study in the near future.

8. BENEFITS OF PROPOSED MODEL

The model proposed in the paper would result into filtered but relevant material to a learner. This would reduce lots of Endeavour and time of a learner wasted in searching the relevant content. This would in turn assist in retaining interest of a learner in his willingness to gain knowledge and learn rather than discouraging him in using World Wide Web for learning. Usage of Keyword Research Tools would result into search in widened but relevant horizon.

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