An Effective Multi Agent Based Intelligent Tutorial System Using ERS

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Abstract - ***Artificial intelligence plays a vital role in the field of many computer applications. Intelligent Tutorial System (ITS) is becoming more effective and popular in recent times since it enables users of all categories without any time slice. It is considered as a useful educational tool which helps the users to interact very lively. In this paper we propose an effective multi agent based intelligent tutorial system (ITS) which functions effectively by capturing the feedback from students in the form of emotions during the session that helps the tutors to enhance their teaching method. The issue of certificate to the students after the course completion is provided by embedding a digital signature for ensuring good security which is desired in intelligent tutorial system.***

Keywords- agent, multi agent, emotion recognition system (ERS), digital signature

I. INTRODUCTION

Agent technology is used to develop and maintain the activities of an agent. In present decades they are used in many domains to reduce the human effort. Agents are nothing but an entity which sense the whole environment and act according to the environment through the effectors. The actuators are screened, writing files and network packets. some of the software agents used in this are co-coordinating agent, testing agent, tutor agent, and sensor agent [8]. When two or more agents are used together to do some work in an effective manner is said to be a multi agent. Artificial intelligence (AI) is a study of rational agents. A rational agent will carry out an action with the best outcome after the considering past and the current percepts.

E-learning is an educational technology that technical support for learning and teaching. They are fully based on online learning. The e-learning May follow synchronous or asynchronous. Synchronous learning is nothing but the learning in real-time that is with all users interacting at the same time [7]. Asynchronous learning is opposite to synchronous, where it is self-placed. The user has to exchange their ideas in the passive manner (i.e. the users will not get interact at the same time). Later the tutorial system has gotten developed.

ITS (intelligence tutorial system) is a mixture of knowledge-based system and expert system. They are able to train and instruct the students and professionals without the intervention of human. IT'S introduced a new set of ideas where they are able to explain the domain problems automatically and also allow the possibility of reasoning. Comparing with e-learning ITS is a new technology which provide a clear difference in the levels of interaction and in the type of teaching. ITS is the best example for the combination of artificial intelligence techniques. Some of the areas included in ITS are natural language, ontology, semantic web and social and emotional computing. The technologies already combined with ITS are distributed system, database, simulations, statistics, multimedia and communication [11]. This paper is divided into five sections: section 1 discusses about the related works available in ITS, section 2 gives a brief description about the types of agent used in ITS, section 3 discusses about the architectural design of the ITS and the working of agents, section 4 discusses about the conclusion and future work.

II. RELATED WORK

The changes that are get added on ITS are more by comparing the present modern ITS with the technology when it get introduced. While introducing ITS it does not contain agents like scooter the tutor.

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In past days ITS was a research in labs. But now days they are step out to the real world. It also includes a machine learning techniques which helps in automatic detection of off-task behaviors of students[4]. It is nothing but the technique which helps to find that the student is listening the class or not. This is done by continuously sensing the model of utilizing a set of time features, performance feature and mouse movement features. The robust ridge regression algorithm is used to develop this process.

ERS(emotion recognition system) which is used to find the emotions of the people with the help of their facial expressions. This ERS is mainly used in psychology. This helps the people to read the facial expressions of emotion. Some real world applications of the ERS are, if a teacher able to read the emotions of the student means they can plan according to it and make their class effective. We are going to use the same process in ITS where the agent is going to monitor the emotions of the students and going to take the class. In past decades the research is mainly done on finding the emotions by the facial expression.

Digital signature is a type of security which is used in the web in today's competitive business world. It's playing a vital role in which enterprises must extend their business in web for the consumers, partners and employees. The web content is getting secured by a standard method, secure socket layer over HTTP. One of the real world applications for digital signature is e-banking system. With the use of digital signature account openings, online loan applications and other approvals are getting accessed [2]. Due to lag in security in ITS, we are introducing the digital signature security system in ITS.

Till now, developing an intelligent tutorial system in emotion recognition system is done in an isolated manner. So far only 7 emotions are considered in the process. In previous architecture, there is no mechanism for collecting the feedback from students both positive and negative feedback this lacks the teaching capability of the student [5]. Many ITS does not provide good authentication to the students. There is also a lack of security during the issue of the certificate of the users. Digital signatures are encrypted during the issue of certificates which ensures a good feature of security to the end users. ActiveMath is the one of the application which is developed with the help of ITS. The main goal of this application is towards the mathematics [15].

III. TYPES OF AGENTS

In this research, to implement an effective multi agent based ITS using students' emotions the following agents are applied in ITS [10]. The function of each agent is discussed in this section.

1. Coordinator agent
2. Tutor Agent
3. Tester agent
4. Sensor agent
5. Course provider agent
6. Feedback agent
7. Login agent

A. Coordinator agent

The Coordinator agent is acting as the controller of the entire system. All functions of the agents are controlled by the Coordinator agent. The main function of this agent is to communicate with all other agents in the system and validate their performance [14]. This agent is used to collect the students' feedback both positive and negative feedback from the feedback agent. The collected feedbacks are sent to the tutor agent by the coordinating agent so as to enhance the teaching capability of the tutor.

B. Tutor agent

Tutor agent is the teaching agent which is going to handle the session for the students.It handles the session according to the instruction of coordinator agent. After receiving the feedbacks from the coordinator agent, the tutor agent enhances it performance based on the received feedback.

C. Tester agent

This is the type of agent which is going to conduct two type of testsGSK and FSK. The GSK will take place before the session gets started. It is

used to find the pre knowledge of the students about that respective subject. The FSK is conducted after the entire session gets over. Tester agent maintains a separate database to store the GSK and FSK marks which can be retrieved during the issue of certificate.

D. Sensor agent

The student emotion are captured by using a sensor agent. The sensor agent uses a camera to capture the emotions from the facial expressions of the students[9]. These emotions are considered as feedback during the session which enables the tutor to increase the capability of teaching methodology.

E. Course provider agent

The function of this agent is to provide the syllabus and test questions during GSK(General Subject Knowledge) and FSK(Final Subject Knowledge). This agent provides the course materials to the registered users electronic mail**.**

F. Feedback agent

Feedback agent is going to collect the feedback from the students by using an emotion recognition system. The emotions are captured by using to the sensor agent and submit it to the coordinator agent.

G. Login agent

This agent functions by collecting the user name and password during the login session apart from this it validates a special type of checking like to scan the length between the eyebrow or eyeball length and store it in a database. During each login it will check and validate the user by this special type also. If the result matches in the database it allows to login the session. This agent also collects the basic student information details during the registration

IV.ARCHITECTURAL DESIGN

The overall architecture of ITS using Emotion recognition system is shown in fig 1.1. this system is divided into the following phases where each phase has an specific function. The phases involved and their description is discussed below.

A. Registration phase

The new users who are interested to join or register by collecting the basic student information. After the details are registered the user is provided with a login ID and password[14]. A special parameter is taken a long with a registration details like the distance between eyebrows iris scanning etc.. are calculated and stored in a database for authentication. Once the users have been registered can login with their ID password and the special parameter is verified to access the session.

B. Testing phase

The registered users invoke the session are provided with two types of test GSK(General Subject Knowledge) and FSK(Final Subject Knowledge) in GSK the users are separated into three categories has slow learner, normal learner and fast learner based upon their performance mark inGSK(General Subject Knowledge). The course management details like syllabus and questions are provided by the course management agent to conduct the test.

In FSK(Final Subject Knowledge) the test is conducted by the tester agent at the completion of the session. The performance marks are stored in the database and retrieve during the issue of digital certificate by the coordinator agent[13].

C. Feedback phase

During the session the tutor agent handles the classes the coordinator agent collects the emotion of the students like sad, happy, eagerness, doubtful, etc… these emotions are collected as feedback during the session and stored in the database. The coordinator agent sends feedback both positive and negative to the tutor agent based on these emotions[4].

Emotion recognition system(ERS) is provided to the tutor agent to enhance the teaching capability of the tutor agent[12]. It also provides an effective interaction between the tutor and the learner in an ITS environment.

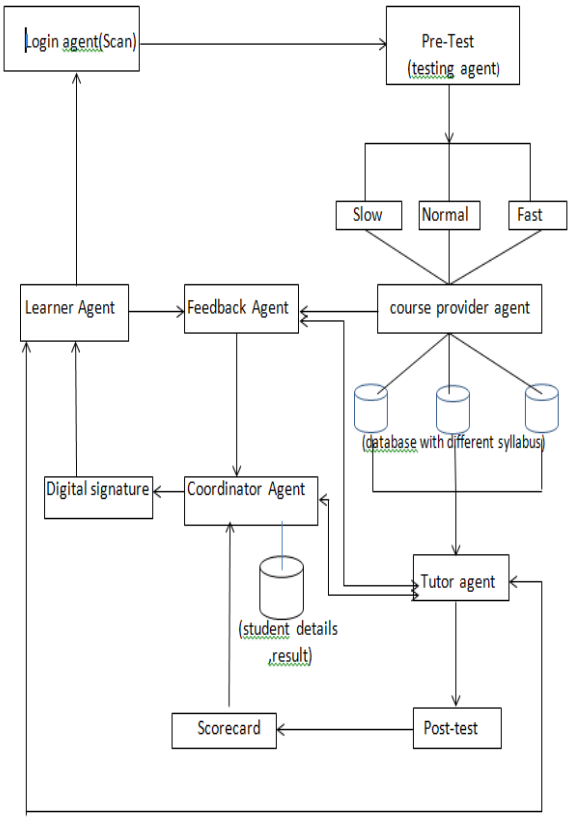

Fig .1 overall architecture of ITS using ERS

D. Completion phase

Once the registered users has completed the session the FSK(Final Subject Knowledge) is conducted. The performance mark in the FSK are stored and score card is issued by encrypting a digital signature for good security.the score card is issued by the tester agent to the coordinator agent.

V.CONCLUSION AND FUTURE WORK

In the previous periods ABITS(Agent based Intelligence Tutorial System) will handle the classes without collecting the feedback from the students during the session. After the session gets completed, the issue of certificate to the students lacks in security issues. In this paper, we propose an effective agent based intelligent tutorial system for collecting the feedback of the students through their emotions. The security to the issue of certificate is given by Digital certificates.

The future work includes a large number of emotions stored in a 3D manner also can be obtained. Implementing this application in a real time is a challenging task. A sequencing rule can be adopted or better course management and administration process.

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