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Usage of Intelligent Software Agents in Selection of Program and Institution for Education

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Abstract

Software agents have started proliferating the world in education, accounting and in society by helping people in information management, scheduling agendas and managing day to day activities. This paper presents an intelligent multi agent system used to choose the program and institution as per the requirements. As the number of programs and institutions have grown multifold it is practically not possible for a student to select the appropriate program and institute. This system presents a solution to help the students in selection in an intelligent way. The software agent acts as a bridge between the institute and the students. It also integrates the data from several ranking organizations to make the system more qualitative. This system also makes sure that the integrity of the data of the user and institute is preserved.

Keywords; *Software agents, Multi Agent System(MAS), Intelligent agents, Software automation*

I. INTRODUCTION

Gone are the days when we had people looking for newspaper ads, filling application forms, enquiring with friends, seeking expert advice and planning the course [1]. We are in an era where people use internet and specially seek agents who can suggest them for every action and every decision they take. The extent of the belief in machines have reached an extent that human does not depend on a fellow rather he depends on the machine to get the work done. A study of machine versus human say that in a span of 20 years machines will be more efficient in human in predicting the outcome of a job in which decision plays a vital role [2]. In the same research there was a comparison of outcome based on countries. It was found that asia followed by Europe lead the graph where machines play a huge role

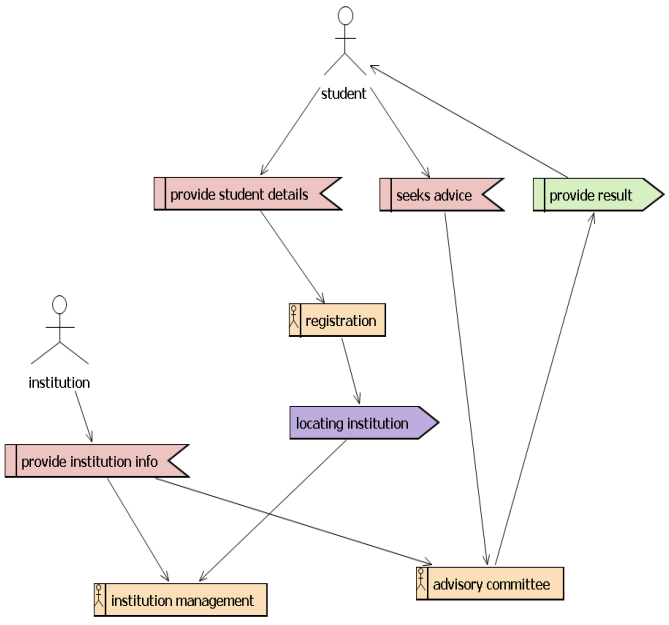

Fig.1. Design view of the system

The figure 1. portrays a design view about the work. There are two software agents that needs to be used. One for the student and another for the institution. As the figure shows the design itself acts like a

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bridge between the student and the institution. The role of the agent is to help the institution and the student not to get mislead with their individual requirements. In a normal case it is said that 30 percent applications get lost due to wrong information and guidance. This is a trade-off both to the student and institutions. As education has gone global there are several parameters that need to be considered in an admission. There are several grading schemes, different naming conventions and policy deviations in every country. Getting to a global educational system at a point of time we need to overcome all these barriers. It is impractical for a person to visit different websites to gather information about different countries. So this system is an integrated solution to cater the needs of both students and institutions.

II. ROLE OF AGENT BASED INTELLIGENT SYSTEMS

The properties of software agent are autonomy, sociality, reactivity, proactivity, goal directivity etc. These properties are going to be applied in every software that is developed with intelligent agent. Application of these properties tend to increase the productivity and learnability of the system.

A Goal directivity of the system

The primary work of any software system is achieving a goal. This being a binary decision and there are several parameters that decide the overall goal. Direction towards the goal depends

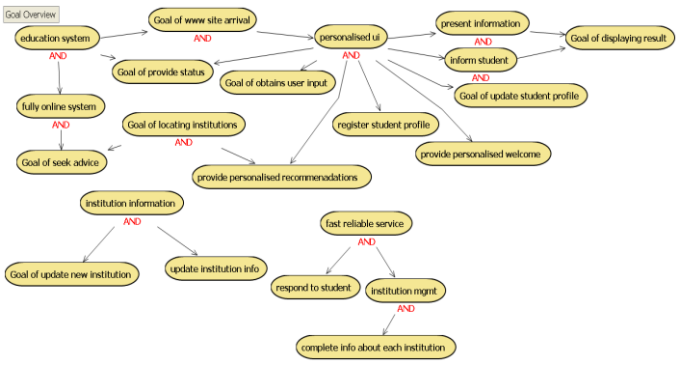

Fig. 2 Goal overview of the system

B Proactivity of the system

It refers to the software agent's ability to take the initiative rather than acting simply in response to their dynamic and unpredictable environment. Software agents should exhibit goal driven behaviour that their action will cause beneficial changes to the environment or bring them closer to the accomplishment of their goals

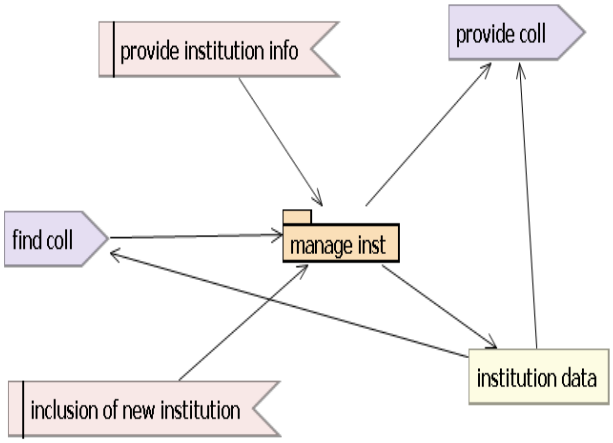

Fig.3 Institution Agent Overview

III. SYSTEM OVERVIEW

System overview diagram provides a comprehensive view of the entire proposed system to be implemented. It also projects interaction among the agents and the messages passed between the agents. The message passing forms the basic communication link between the agents in the system. The various agents involved in the system communicate with each other through messages in order to achieve the system goal. Every agent is associated with a set of protocols to be followed while performing actions to reach the goal. The parameters to be considered during the process are usually specified in the message communication between them. The communication between the agents, the protocols and the actions to be performed by each agent are indicated diagrammatically below.

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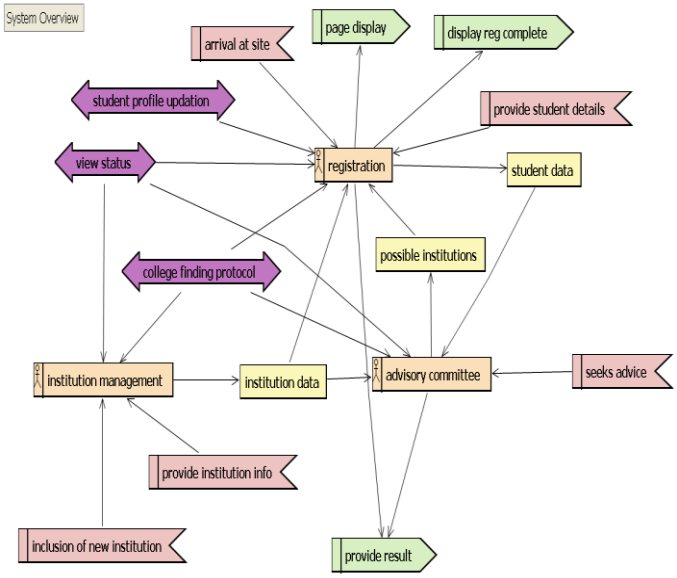

Fig. 4 System overview Diagram

IV. DETAILED DESIGN

In the detailed design stage, each agent is described in detail and a capability is associated with every agent. The capability is broken down either to further capabilities or eventually into the set of plans that provide the details of how to react to the situations by means of perceptions and actions. The capabilities of the agents are based on the initial analysis and goals and roles assigned to the agents.

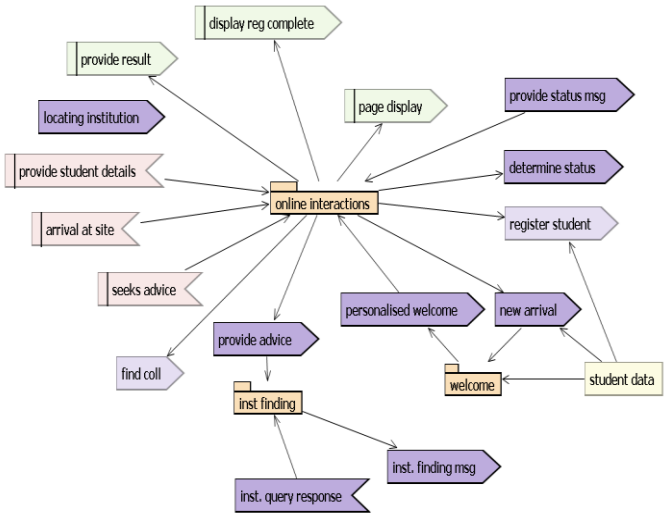

Fig.5 Registration Agent Overview

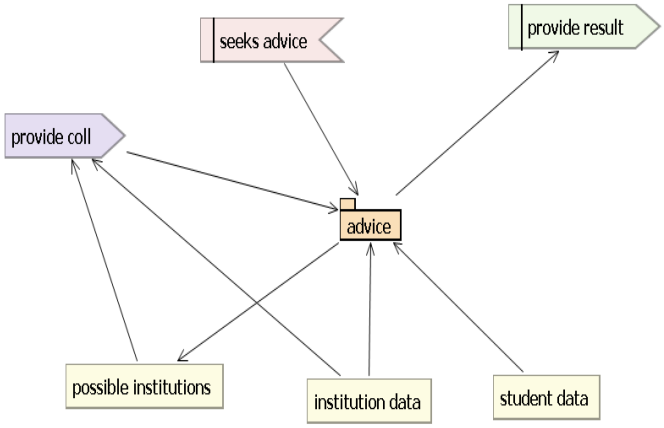

Fig.6 Advisory Agent Overview

V. IMPLEMENTATION DESCRIPTION

The implementation of an agent based system involves the creation of agents, assigning tasks and goals to them, establish communication links between agents through agents. Every agent is assigned with a goal and a set of protocols and plans that compliment in attaining the goal. As soon a specific task is initiated, the corresponding agent is invoked and put to task. When a new user registers, an agent is invoked automatically and agent stores the details of the user in the knowledge base. When a new institution is added, institution management agent is invoked to update the institution knowledge base. If the details of the existing institutions are to be modified or a user's information should be updated, then it is necessary to login as the admin

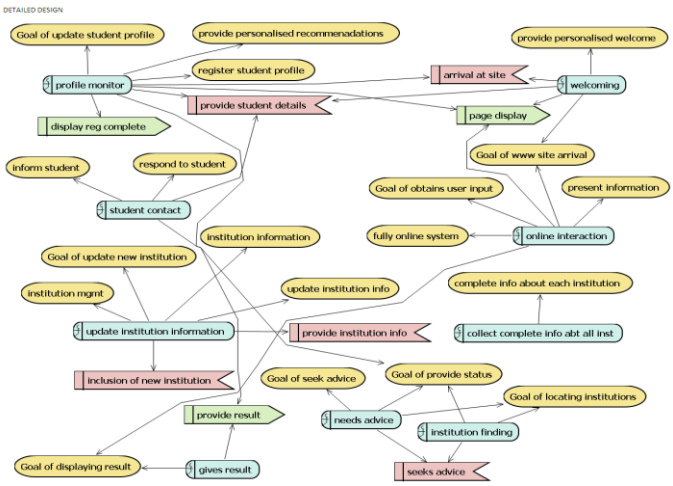

Fig.7 Detailed Design

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When a user tries to locate a particular institution of his/her choice, the user's priorities are passed as parameters to the advisory agent. The advisory agent searches a suitable institution for the user on the user's behalf. The advisory agent communicates and coordinates with the institution management agent in accessing the institution's information and locating a suitable one for the user based on the specifications provided. The advisory agent returns back the surveyed details to the user. The user, if satisfied with result of the can register for application proceedings in the institution. The registration agent registers the user and also calculates the fee corresponding to the particular course. The various agents created are to be tested using various testing techniques to determine their efficiency in testing an agent system.

VI. TESTING

The implementation is followed by testing phase. As computers and software are used in critical applications, the outcome of a bug can be severe. Bugs can cause huge losses. Testing is done with a view to locate the possible bugs in the system. The testing method could be developed for testing the functionality of the system like the actual code or the non-functional requirements of the system like amicable user interface. There are various levels of testing used in the traditional approach like unit testing, integration testing, system testing, etc. Moving further to the object oriented approach; specialized testing mechanisms are available to the products developed in object oriented methodology. But in the agent paradigm, such a complete and dedicated testing mechanism is currently not established. Hence, presently, we employ the existing traditional and object oriented testing techniques to test an agent system.

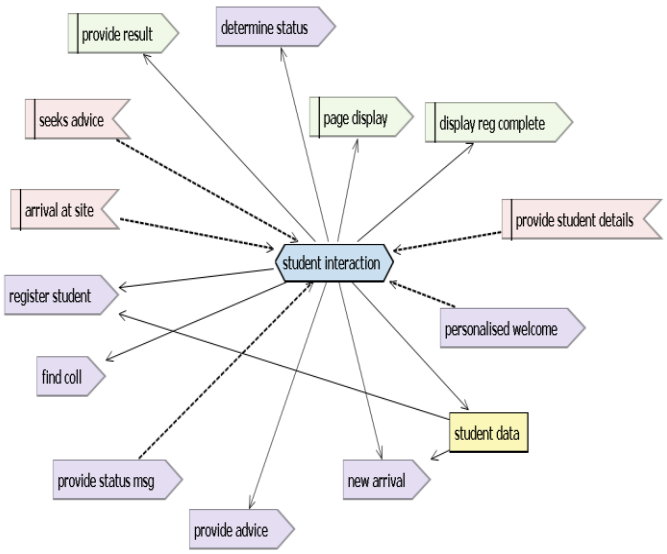

Fig.8 User interaction Overview

The Unit testing in agent will consider agent as a basic entity and it will test the functionality of that particular agent. The next step of unit testing is to integrate the system and check for the functionality of the system in an incremental manner. This is termed as integration testing. The agents that succeeded unit test are integrated and its protocols used between the two agents to communicate are tested. The integration test will identify the bugs if there is any problem in communication between the agents. System testing in agent oriented approach will test the complete functionality and test the system as a whole. Here the perceptions and actions of all the agents are tested as a whole by providing proper test cases.

In the education system under consideration, the various agents are tested individually for their functionality. It is also necessary to determine if the number of agents involved in the system would be sufficient to carry out all the activities of the system. This forms the first level of testing called the unit testing. The registration agent, institution management agent, advisory agent, admin agent and user agent are tested individually for their functionalities in this phase.

The agents are integrated and tested if there exists a

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harmony in their working. The agents' communication and message passing parameters are tested and the agents' reply to the message is also tested. This forms the second stage of integration testing. The communication between the user agent and admin agent, communication between advisory agent and institution management agent, communication between advisory agent and registration agent, etc are tested in the phase.

The agents that pass the integration testing are now tested for their protocols of communication. Once all these aspects have been tested and the errors are rectified, the entire functionality of the system is tested on the whole. The actions and percepts of all the agents are also tested. Black box testing is employed and various test cases are generated. The test cases are passed to the system one by one and the behaviour of the system is observed. Based on the output of the system, the errors are rectified and the system is honed for better performance. This helps to evaluate the efficiency of the various testing system in testing an agent system. Based on this it is possible to determine if the existing testing methods could efficiently test an agent system and also if they would suffice to test an agent based system in the long run.

VII. CONCLUSION

As we have experienced in the above example for course selection it is practically impossible for a human to manually take the decision of a course. Any field required interruption of software agents. The following Multi Agent system minimizes our work and gives multiple suggestions according to our preferences. The above work helps us understand how do we take the preferences of a human and in turn it helps in motivation the result of the human. In future many problems that human is not able to take decision of conclude can be developed with the help of software agents.

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