Chapter 9: Conclusion & Future Work

This chapter presents a summary of my work. It highlights the main contributions of the thesis. This chapter also discusses the advantages of this agent based expert system and at the same time it also discusses the limitations. And at last it also discusses the scope for future work.

9.1 Summary of the Research Work:

This thesis describes a research focusing on agent-based expert system for assessing student’s knowledge. The work mainly encompasses detailed investigation of different types of agents and its functionalities. Study on agent technology and expert systems are carried out in the design of the agent based expert system called EESOA. Since, I have used agent development environment in the design and development of EESOA and hence a detailed discussion on different agent development environments are presented. Also I have given brief discussion on distributed environment and how it is being treated in this research work. I have then presented the architectural framework of EESOA. The system design and implementation phases are explained, which are the vital parts in the development process of this expert system. And at the last testing and evaluation of this expert system are also explained.

9.2 Research Goals and Contributions

As mentioned above, the research goal of this thesis is to develop a framework and subsequently to develop an agent based expert system,
EESOA, on top of this framework. The mobile agent in collaboration with the local agent in each server fetches questions; and after fetching taking a round in the servers it comes back to the expert system server and thus the expert system is able to present dynamic questions to the student based on the student’s knowledge level for assessing the student. To achieve this research goal, three main objectives were identified.

(i) To identify a suitable agent development environment for the design and development of the agent based expert system.

(ii) To conceptualize and design a very well-structured distributed database environment.

(iii) To define and design a framework for agent based development in distributed environment and then also develop an agent expert system for online assessment in distributed environment by integrating the agent technology with JESS on top of the framework.

9.3 Advantages of EESOA

(a) The agent development environment used in this work is JADE which is Java based; and the other components of EESOA are also Java based and thus whole system becomes platform independent though we have experimented with Windows platform.

(b) Since, in this system the concept of distributed database environment is used to group different types of DBMS from different servers/machines under one roof with the help of agent concept and hence this system will be
very useful for the universities to share their question banks for assessing their students' knowledge and improvements.

(c) This system is not only useful for assessing their students' knowledge level but also provides a strong backbone for conducting different learning programmes/courses in collaboration mode by different universities.

9.4 Limitations of EESOA

(a) The system is designed and tested with few student users and a very few different DBMSs with few questions in the question bank. So, it is yet to see how the system will perform in a large network with huge size of question bank as a whole.

(b) While testing, the no. of questions, the mobile agent can fetch, is considered to be at-most 30. But this may not be the case with assessments in actual practice. Organizations may have their own choice on no. of questions to be asked in assessments.

(d) If case, all of the universities in collaboration want to adopt this expert system support for conducting their assessment process they will get two main difficulties, mainly: all of them must have this expert system in their own servers, and also they have to modify the structures of their student data-bank as well their question data-bank.

9.5 Future Research Directions

(a) The aim behind this research work is to integrate agent technology with expert system technology for assessing student knowledge. So, while
designing and developing the prototype system, no performance analysis is done basically for lack of time. So, this system can be extended by working on some performance analysis.

(b) Also, I have not dealt with the security issues related with the agent system of this expert system. So, working on security issues of the agent system part of EESOA can also be an extension.

(c) In case of EESOA, rules are static. This research can be extended by working on automatic generation of rules with the application of machine learning techniques.

(d) Since the student model is stored and updated in an external database, for a large number of students, retrieving the student information by the expert system for assessment may decrease the performance of the system. So, application of appropriate data mining techniques/algorithms can solve the problem.

(e) This system also can be extended, by adding new technologies Big-data or by modifying the existing one so that the structures of the question bank databases, in all the servers, need not to keep the same.