CHAPTER 9

CONCLUSION AND FUTURE WORK

The science of Artificial Intelligence (AI) is approximately forty years old, dating back to a conference held at Dartmouth in 1958. During the past forty years, the public perception of AI has not always matched the reality. However, the early successes were followed by a slow realization that what was hard for people and easy for computers was more than offset by the things that were easy for people to do but almost impossible for computers to do. Nevertheless, researchers in AI have made significant contributions to computer science. Many of today’s mainstream ideas about computers were once considered highly controversial and impractical when first proposed by AI community.

Today, the idea of intelligent software agents helping users to do tasks across networks of computers would not even be discussed if not for the years of research in distributed AI, problem solving, reasoning, learning, and planning. We are now well into a third phase of AI applications. Since the late 1980s, much of the AI community has been working on solving the complex problems of machine vision and speech, natural language understanding and translation, commonsense reasoning, and robot control. Recently, the explosive growth in the internet and distributed computing has lead to the idea of agents that move through the network, interacting with each other and performing tasks for their users. Intelligent agents use the latest AI techniques to provide autonomous, intelligent, and mobile software agents, thereby extending the reach of users across networks.
As it is stated earlier, the **technical goal of this work is to develop a multi agent platform for processing of bio-signals aiming at assisting medical practitioners in developing standard examination procedures**. As such there is no system exists of this nature. The opinions of two medical practitioners differ for the same EEG / ECG / EMG. As the output of this system has to be taken out from the EEG / ECG / EMG Expert Systems every user of the system will be getting the same report. No expert system of this kind is in existence. Hence, the experiments have been carried out with prototype of such models. Some of the sample datasets of EEG / ECG / EMG waveforms have been taken as input to the system and a database has also been used to store the details of the patients for future reference of the medical practitioners. In the database, Social Security Number, Name of the Patient, related Waveform and the reports are being stored which help the Medical Practitioner to review the patient’s history.

As far as the computational efficiency of the system is considered, it stands as its best, as Java is being used as its programming language. Java provides all the required functionality to design and implement intelligent agents. Its general-purpose language capabilities allow knowledge to be represented and reasoning and learning algorithms to be implemented with ease. Moreover, Java Threads allow the execution to be done with ultimate fastness. Java’s portable bytecodes allow agents to be packaged as applets or as mobile Java programs.

More emphasis has been given on Agent Oriented Programming approach for developing intelligent agents for the proposed system. As there exists no such system, the comparison between Object Oriented Programming and Agent Oriented Programming approaches are listed below:
1. OOP views the computational system as made up of modules (classes and objects) where as AOP specializes the framework by fixing the state (mental state) of the modules (Agents) consisting of components such as beliefs, capabilities, decisions.

2. In OOP approach, each module carry out a particular task where as in AOP, various constraints are placed on the mental state of the agent.

3. In OOP, modules can communicate with each other and have individual ways of handling messages where as in AOP, a computation consists of these agents informing, requesting, offering, accepting, rejecting, completing and assisting one another.

Even though both objects and agents communicate with other objects or agents through message passing, in case of objects, message from other object is simply a request to carry out some task. The object to which the request is sent knows how exactly the task is to be carried out. All the tasks which an object can perform are specific, in other words, objects can only perform tasks they are trained for. Agents, on the other hand can affect the behavior of other agent through message passing.

The JADE platform is a popular, FIPA-compliant platform for the development of multi-agent systems. However, prior to this, no earlier work on bio-signal processing had been proposed for the analysis and design of multi-agent systems using the JADE platform. The multi-agent system for processing Bio-signals will help the medical practitioners to have a standard examination procedure. It also helps the medical practitioner to interact with the expert in the field of his need in order to make a proper judgment in the
diagnosis phase. As the agents on the JADE environment run on Threads, the response time is very less which helps the medical practitioner to make a quick diagnosis.

As the health care industry is of more demand, the latest developments in the technology can be thought of integrating with it. In this direction, there are several issues remaining for future work, which include:

- More emphasis on agent internal structure and mechanisms.
- Development of multi-agent system to deploy on mobile network with which the patients can be monitored through wireless media.
- Developing and accessing Expert System for specific applications.
- Bio-metric based applications can also be developed with mobility of agents.