Smart Agent-Based Hospital Search, Appointment, and Medical Diagnosis

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ABSTRACT

Various areas of the healthcare industry have seen some progress in the use of ICT to aid in the treatment of patients including some amount of automation in the key areas. The authors infer that some pitfalls exist in the healthcare administration. To obviate these, the use of Agent technology as a practical solution to solve some hospital related issues with particular emphasis on hospital search and appointment allocation has been researched. The authors explore the use of agent technology to assist patients seeking treatment for their ailment at a hospital chosen, and priority is provided based on treatment. The patients have been given the facility to select an appropriate hospital based on their preferred selection criterion, achieved through the use of their mobile phone by exactly replicating the job of a human being agent. The authors study first how smart agents can be used to search for hospitals based on user selection criteria in combination with the Google Map facility and fairly diagnose their medical ailments using Layman language. The Agent proposed here, also facilitates verification of doctor’s license before the appointment with him is confirmed. Lastly, the proposed system provides the rating and the popularity factors of the selected hospital in respect of ailment based and on number of persons visited. The system also alerts the hospital for poor rating/popularity enabling working towards improvement. The Smart agents proposed for action act autonomously and have the ability to intelligently use the available knowledgebase and user parameters to make appropriate decisions on behalf of the user. The system uses ANDROID 2.2, JADE-LEAP and the Google API to provide a robust, user friendly solution.

Keywords: Agents, Android 2.2, Hospitals, Information Communication Technology, Java Agent Development Environment-Lightweight Extensible Agent Platform (JADE-LEAP), Medical Diagnosis

1. INTRODUCTION

Health sector is a growing field and it has been a major concern for everyone (Gupta & Denton, 2008). Personal health, good or bad, is a major concern for an individual, an employer and the country as a whole. Ill health has a major effect on a family, the community and also on the productivity of any country. In the context, the health care industry has its definite role to play in terms of minimizing the down time of treatment and also improving the personal well...
being. In this regard, there have been many innovations introduced in this industry ranging from the use of organic to advanced technologies with a view to alleviate the problems that people are facing from time to time, like the patient billing and record keeping towards treating, analyzing data and diagnosing from the medical symptoms, etc. However, there still exist some weaknesses in such systems as they fail to fully utilize the modern Information and Communication Technology i.e., ICT in an efficient manner. These days mobile phones have largely increased in popularity as such they allow persons to constantly be in touch with each other. There are times when we are unable to get through to the respective doctor with whom we would like to speak and discuss regarding the ailment. This would obviously pose a serious problem in the health of the individual during emergency.

It may be mentioned here that the use of software agents (Franklin & Graesser, 1996) to mimic the behavior of a human agent can alleviate this problem particularly in the critical field of health care where one may need to access a doctor/hospital for treatment. There has been a quite an amount of research work carried out in the use of software intelligent agents in the healthcare industry towards hospital search and appointment (Edwards & Suresh, 2009, 2011) and these have been explained in Section 3.1 of the paper. In spite of these, there still exist some deficiencies in those proposed systems and these are the motivations for this research and this paper. Consequently we have developed a smart agent based system towards searching of hospitals in a particular location using GMAP, price base for a particular ailment using the layman’s language without needing medical terminology. Also this proposed system allows the appointment with a particular doctor in the hospital after verifying his license to avoid approaching fake doctors. Rating and popularity of the hospital also get calculated based on number of persons getting medicated rather than just displaying the rating information alone. Finally the system also alerts the hospital authorities for poor rating/popularity enabling improvement. All these factors contribute to the improvement over the previous systems proposed by the authors and hence the novelty of the research work that has been carried out now and that is the scope of the paper.

The paper is organized in sections as follows. Section 2 provides details on ICT usage in Health Care System and in Mobile Health Care. Section 3 talks on Intelligent Agents followed by Agent based health care system. Section 4 gives details on the Smart Agent based hospital search, appointment and medical diagnosis. Section 5 gives the implementation details of the proposed system on JADE-LEAP and Android 2.2 with Google Maps API. Section 6 is the conclusion and future work.

2. ICT IN HEALTH CARE

These days Information Communication Technology (ICT) plays a very important role in the health care sector. ICT has improved the delivery mechanisms that emphasize the primary and community sectors, for home care, day care and call centers. These systems are complex and thus it is otherwise difficult to find the best strategies to bring efficiency and effectiveness. Thus public health strategies have devised methods by using ICT to gain advantages through telemedicine and telecare (Cramp & Carson, 2000). It may be said that the health care system has been under increasing pressure as populations are aging; life expectancy is increasing and the number of health care professionals decreasing and in addition there is an increased cost towards health care and the continuing urbanization. In the context, ICT would seem to provide the countermeasures for these problems through providing a more efficient health care solution. Consequently we can expect improved healthcare access, reduced cost and an improved quality of treatment through the use of ICT.

Telemedicine, which is seen on the whole as an important field for healthcare modernization, has great potential for enabling the delivery of
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