Application Service Provider System for Healthcare with Data Mining Function

Hiroshi Takeuchi[a], Yuuki Mayuzumi[a], Naoki Kodama[a], and Keiichi Sato[b]

[a] *Department of Healthcare Informatics, Takasaki University of Health and Welfare, Takasaki, Gunma, Japan*
[b] *Life Science Division, Hitachi Software Engineering Co., Ltd., Yokohama, Kanagawa, Japan*

Abstract

An application service provider system for healthcare with a data mining function has been developed. The system provides computer-based healthcare services over the Internet to advise customers on how to improve their lifestyles on the basis of association rules relevant to their health and lifestyle data. These association rules can be automatically extracted using a data mining technology on the server computer on the basis of customers' stored time-series health and lifestyle data that are transferred through their mobile phones or PCs. The healthcare adviser can send comments made up of the rules to the customers over the Internet.

Keywords:

ASP system for healthcare, Data-mining, Time-series data.

Introduction

Previously, we developed a personal dynamic healthcare system (PDHS) using the Internet [1]. This PDHS enables time-series daily-health and lifestyle data to be stored in a database by using a mobile phone and web technologies. Users of this system input their daily data into a mobile phone and transfer these data to a web-application server via the Internet. The web-application server provides a data-mining service and notifies users, through their mobile phones, of important rules relevant to their health and lifestyle.

With this poster, we present an application service provider (ASP) system as an enhanced version of PDHS. In this system, the healthcare adviser can send comments made up of the produced association rules to the customers over the Internet.

Methods

The ASP system we developed is shown in Figure 1. Customers can send their health and lifestyle data through mobile phones or PCs manually (automatically in part). A server produces association rules relevant to customers' health and lifestyle data once every three months on the basis of their stored time-series data using a data-mining technology. Healthcare advisers (typically dietitians and public health nurses) can make up comments of the association rules.

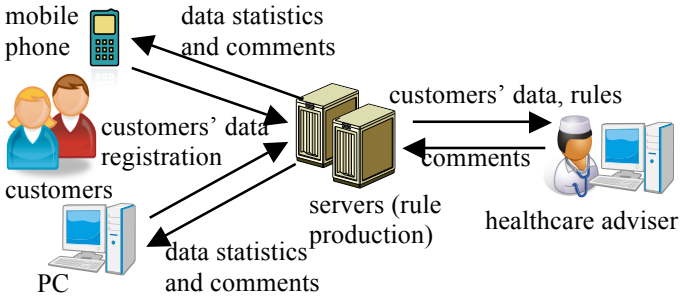

Figure 1 – Developed ASP system

Association rules between health and lifestyle data are expressed as follows: "if lifestyle data_1 fulfills condition 1 and lifestyle data_2 fulfills condition 2, then health data has a certain value" in the case of two antecedents. These rules are extracted using a generalized rule induction algorithm [2], after determining input variables from time-series data analysis.

Results

Now eleven volunteers are using the developed ASP system. The volunteers registered thorough their mobile phones. Registrations include health and lifestyle data items as well as demographic ones. They input daily health and lifestyle data through either mobile phones or PCs. They can refer to their data statistics and healthcare adviser's comments on either mobile phones or PCs.

Conclusion

An ASP system for healthcare with data mining function was developed. The system is now on a test run.

References

[1] Takeuchi H et.al. Healthcare data mining based on a personal dynamic healthcare system. 2nd CIMED 2005; 37-43.

[2] Smyth P and Goodman RM. An information theoretical approach to rule induction from database. IEEE Trans. Knowledge and Data Engineering 1992; 4, 4; 301-316.