Shusaku Tsumoto - IRSS Fellow Plenary Speaker

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Title of the talk: Decision Support based on Analysis of Big Data

Abstract: More than twenty years have passed since clinical data were stored electronically as a hospital information system (HIS). Stored data give all the histories of clinical activities in a hospital, including accounting information, laboratory data and electronic patient records. Due to the traceability of all the information, a hospital cannot function without the information system. The impact of HIS over clinical environments may include two factors. One is improvement of the quality of clinical service and the other is the service software itself for clinical decision making and hospital management. However, there are very few studies on both aspects. Concerning the former factor, Hubner-Bloder and Ammenwerth introduce performance indicators calculated from a questionnaire to the patients and doctors. Although they show the changes before and after HIS has been introduced, they can only evaluate overall performance and are not able to detect which software improves the service qualities. As for the latter factor, Anema et al use HIS to evaluate clinical indictors for the quality of surgical operations. Reuse of the stored data for these purposes has not yet been discussed in detail, except for the evaluation of several clinical indicators of laboratory data and accounting information to which OLAP methodologies are applied. Moreover, these analytics are very naive and a data mining approach only started about fifteen years ago.

In this talk, we propose a data-mining-oriented estimation for changes of service quality before and after new programs in HIS have been installed. We introduce the following data-mining-centered software development process. First, data extracted from hospital information system is used to capture the peculiarities of the divisions in a university hospital. Then, the mining results are interpreted by medical sta and the solutions are discussed. Based on the discussions, new interfaces are developed, and their performance was evaluated using the service logs. The process was empirically evaluated in Shimane University Hospital, Japan, and shows that the process will provide a new framework for quantitative evaluation of software development in a hospital information system that can be viewed as an application of an active mining process.

Biography: Shusaku Tsumoto graduated from Osaka University, School of Medicine in 1989, during which he was involved in developing medical expert system. After a resident of neurology in Chiba University Hospital, he moved to emergency division (ER room) in Matsudo Municipal Hospital from 1989 to 1991. Then, he moved to Division of Medical Informatics in Chiba University Hospital and was involved in developing a hospital information system in Chiba University Hospital from 1991 to 1993. He moved to Tokyo Medical and Dental University in 1993 and started his research on rough sets and data mining in biomedicine. He received his Ph.D. (Computer Science) on application of rough sets to medical data mining from Tokyo Institute of Technology in 1997. He has become a Professor at Department of Medical Informatics, Shimane University in 2000. From this year, he is in charge of network system in Izumo Campus of Shimane University and of hospital information system in Shimane University Hospital. In 2008, he has become a visiting professor of Institute of Statistics and Mathematics. His research interests include approximate reasoning, contingency matrix theory, data mining, fuzzy sets, granular computing,

knowledge acquisition, intelligent decision support, mathematical theory of data mining, medical informatics, rough sets, risk sciences and service-oriented computing (alphabetical order).