Department of Systems Engineering and Engineering Management

Effective Learning and Knowledge Discovery using Processed Medical Incident Reports

Prof. Masanori Akiyama M.D., Ph.D.
Policy Alternatives Research Institute,
The University of Tokyo, Tokyo, Japan

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Abstract

Objectives: We propose a new approach to detect the precarious situation in medical care and solve the communication-gap by analyzing tracking record. With increasing social demand for the prevention of medical incidents, the Ministry of Health, Labour and Welfare Japan started the project to collect medical incident information from 2001 and to provide information conducive to patient safety, such as measures for improvements. From 2004, the Japan Council for Quality Health Care took over the collection of incident case studies, collecting case studies from the latest collection. The results of aggregate calculations and analysis are published on the website of this organization.

Methods: In this paper, we evaluated the degree of similarities between incident documents obtained bottom-up and the links between existing classes granted top-down. We made it possible to evaluate overall similarities regarding incident documents with the techniques of natural language processing and network analysis. The characteristic words were all selected based on actual data. Networks obtained from similarities with these characteristic words remove the effects of similarities shared in common with all documents and are formed from the overall combination of an

independent degree of similarity between two documents. This kind of network is first realized by extracting characteristic words bottom-up. In cases where keywords that should be checked top-down are decided, there are instances when, after having conducted class, there is no guarantee that that keyword is not valid and a network of documents linked only by the characteristic similarities such as those described above cannot be obtained.

Results: Under the category of "accident background," the words "lack," "confirmation," "inadequacy," "drugs," and "instruction" rank high. Moreover, the fact that the word "nurse" ranks high suggests that there are many accidents related to nurses. Also, the words "confirmation," "drugs," and "double check" rank high under the category of solutions. In this research, we evaluated the degree of similarities between incident documents obtained bottom-up and the links between existing classes granted top-down. We made it possible to evaluate overall similarities regarding incident documents by using the method of network analysis. With regard to the background, the results of the analysis demonstrated that compared with abstract and solution, existing classes are inadequate for representing the characteristics of documents and that there is a need to improve classes.

Conclusion: The characteristic words were extracted by analyzing incident reports, and the co-occurrence networks of the characteristic words were created. As a result, the language networks with the hub of the word "confirmation," thereby revealing that inadequate confirmations on the drug labels, instructions of a physician and patient were very significant causes of accidents. In addition, the class of patient managements regarding patients' fallings in top-down analysis is created clearly. On the other hand, some categorizes by top-down analysis don't reflect the category by the bottom-up analysis. These results suggest the effectiveness of introducing the network analysis method. In the future work, we would like to focus on the medical reports for improving the notational rules for the names of drugs and dosages in incident reports. Also, we would like to analyze the differences of understanding of the incident reports between positions like doctors, nurses, pharmacists.

About the Speaker

Prof. Masanori Akiyama M.D., Ph.D. He is a professor at Policy Alternatives Research Institute, the University of Tokyo.

He worked in some hospitals such as National Shikoku Cancer Center and National Center for Global Health and Medicine（International Medical Center of Japan）. He also has the experience of government officer at the Ministry of Health Labour and Welfare, Japan. He is a Fellow of the Japanese Urological Association, the Japanese Society of Nephrology. And he worked the leader of some national projects such as the information system for Regional Health Information Organizations (RHIO), the drug information system, and clinical information system for HIV. Moreover, he made the mechanism for the production control of the medical practice that used Point of Act System （POAS）in 2001, and he achieved Risk Management and Measuring Productivity with those.

He worked as a visiting professor at Massachusetts Institute of Technology Sloan School of Management from 2005 to 2010.

He was a chairman of national RFID research project by Japan Ministry of Education, Science and Technology and a chairman of the national RFID research project by Japan Ministry of Ministry of Economy, Trade and Industry between 2005 and 2008. Also He is a chairman of national Tele-homecare research project with smart phone and cloud computing by Japan Ministry of Internal Affairs and Communications.

He is a Board member of the Japan association for medical informatics and a Board member of the Institute of Digital Forensics. He has been a Japanese government representative of WHO (World Health Organization) World Alliance for Patient Safety from 2008 and one of a leader of the International patient safety project with IT.

Enquiry: 3442 8408

All are welcome!

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