Medicine Rating Prediction and Recommendation in Mobile Social Networks

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Abstract. During last few years we have witnessed a steady increase in medicine use for healthcare. The medicine experiences rated by other patients have huge potential to empower people to make more informed decisions. While the majority of previous research focused on rating prediction and recommendations on E-Commerce field, the area of healthcare or medical treatments has been rarely handled. Moreover, the geographical and temporal factors were not considered in their recommendation mechanisms. The rapid development of mobile devices, wireless networks, smart phones and ubiquitous wireless connections enable people to build and maintain mobile social interactions and relationships. In this paper, we identify and formalize the significant problem that exploits the over-the-counter medicine rating prediction and recommendation in mobile social networks. Then we devise the recommendation model and develop corresponding prototype of iDrug, reflecting a solution scheme of medicine rating prediction and recommendation in mobile social networks to increase the information accessibility for people's decision support.

Keywords: Machine learning, Medicine rating prediction, Mobile social network, Recommender system, Ubiquitous healthcare.

1 Introduction

With the rapid development of society and technology, people are becoming more healthy conscious in recent years, they usually take various medicines periodically in order to normalize serum cholesterol, glucose levels, or for the purpose of losing their weight [1] [2] [6]. As shown in Figure 1, the cost of medicines in the U.S. was 234.1 billion $ in 2008 which was more than double what was spent in 1999, indeed almost half of the populations take prescription medicines every month [4]. At the same time, these medicines often have debilitating and life-threatening side effects which are the
factors should not be neglected, when a person takes multiple medicines and experiences a new symptom. It is not always clear which, if any, of the medicines or medicine combinations are responsible [6]. As new medicines are introduced continuously and still new patients for old medicines are found, more and more patients can improve their health and quality of life with the appropriate use of different medicines [2]. Obviously, the use patterns of current different kinds of medicines need to be better understood, especially the over-the-counter (OTC) medicines. Which can increase information accessibility for customer decision-support, e.g., to purchase healthcare or disease-treatment medicines etc.

In the past when people had a problem, they used to seek support and advice from family or friends. Nowadays they turn to smartphones or internet that can often make up by being less judgmental and more anonymous. A survey conducted by “Opinion Research Corporation”\(^1\) reveals that 34% of people who search health information use mobile social resources, online forums and message boards etc. Meanwhile, according to “Pew Research Center”\(^2\) 20% network users suffering from a chronic condition such as high blood pressure or diabetes, they try to find medicines of others with similar health concerns. Moreover, there are many medicines which can be purchased via online shopping where they can publish opinions and read many medicine reviews and comments [2].

There is no doubt that many researchers apply machine learning and data mining techniques to recommender systems. It has also gained some impact in tourism, restaurant, and entertainment [1] [3] [8]. However, recommendation techniques can be improved, by utilizing the geographical and temporal information to make medicine rating prediction and recommendation in mobile social network. These techniques have still been largely neglected [8]. Increasingly, the patients are turning to smart phones to seek medical suggestions. The wide usage of mobile social networks facilitates the development of social recommendations which are common

\(^1\) http://www.icrossing.com/articles
\(^2\) http://www.pewinternet.org/reports/2011/p2phealthcare.aspx