From Personal Wellness to Healthcare Support Systems: A Big Data Driven Approach

Tat-Seng CHUA
School of Computing
National University of Singapore, Singapore
dcscts@nus.edu.sg

ABSTRACT

The abundance and growing usage of social media has resulted in a huge depository of users' social posts, which provide a stethoscope for inferring individuals' habits, preferences, lifestyle and wellness. In this research, we look into mining users' wellness in terms of three aspects of users' lifestyle: activities, food and medication. This is done by analysing users' public social posts on twitter (text), FourSquare (location), Instagram (image) and Endomonda (Sensor). We then develop a multi-source multi-task learning model to mine users' individual wellness profiles as well as group profiles for critical illnesses, such as the debate and obesity. Such illnesses are of key concerns to many individuals and government agencies.

From critical illnesses, we further explore the combination of social wellness analytics with other healthcare resources towards building a "big-data-driven knowledge-oriented healthcare support network". The network offers the latest healthcare knowledge drawn upon information from five heterogeneous sources. They are: (a) the authoritative and reliable healthcare knowledge bases such as the WebMD; (b) the community QA sites such as the HealthTap where questions by users were answered by doctors; (c) crowd-based sources such as the Patientslikeme that contains many treatment records voluntarily shared by the patients; (d) the social signals gathered from social media platforms that cover mostly safety and critical illness-related issues; and (e) other miscellaneous information such as the weather, health sensors and medication related knowledge. Extensive research has been done to automatically integrate the gathered information into a comprehensive healthcare taxonomy and a vertical domain question-answering system. One use case of such system is to realize a social D2D (Doctor-to-Doctor) network, aiming to bridge the know-how gap between the well-trained doctors in the cities and community doctors serving the rural areas. Such network will help to enrich the knowledge and bring credibility to community doctors, and hence alleviate the imbalance in healthcare resources in many developing countries.

CCS Concepts

•**Information systems → Multimedia information systems;**

Keywords

Multi-source Learning; Healthcare

BIO

Dr Chua is the KITHCT Chair Professor at the School of Computing, National University of Singapore. He was the Acting and Founding Dean of the School from 1998-2000. Dr Chua's main research interest is in multimedia information retrieval and social media analytics. In particular, his research focuses on the extraction, retrieval and question-answering (QA) of text and rich media arising from the Web and multiple social networks. He is the co-Director of NExT, a joint Center between NUS and Tsinghua University to develop technologies for live social media search.

Dr Chua is the 2015 winner of the prestigious ACM SIGMM award for Outstanding Technical Contributions to Multimedia Computing, Communications and Applications. He is the Chair of steering committee of ACM International Conference on Multimedia Retrieval (ICMR) and Multimedia Modeling (MMM) conference series. Dr Chua is also the General Co-Chair of ACM Multimedia 2005, ACM CIVR (now ACM ICMR) 2005, ACM SIGIR 2008, and ACM Web Science 2015. He serves in the editorial boards of four international journals. Dr. Chua is the co-Founder of two technology startup companies in Singapore. He holds a PhD from the University of Leeds, UK.