

Chapter 4

Wiki-Health: A Big Data Platform for Health Sensor Data Management

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ABSTRACT

Quickly evolving modern technologies such as cloud computing, Internet of things, and intelligent data analysis have created great opportunities for better living. The authors visualize the role these technological innovations will play in the healthcare sector as they spearhead a shift in focus from offering better healthcare services only to people with problems to helping everyone achieve a healthier lifestyle. In this chapter, the authors first discuss the existing and potential barriers followed by an in-depth demonstration of a service platform named Wiki-Health that takes advantage of cloud computing and Internet of things for personal well-being data management. It is a social platform, which is designed and implemented for data-driven and context-specific discovery of citizen communities in the areas of health, fitness, and well-being. At the end of the chapter, the authors analyse a case study to illustrate how the Wiki-Health platform can be used to serve a real world personal health training application.

INTRODUCTION

Recent developments in modern technologies such as cloud computing, wearable sensor devices and big data have significantly impacted people's daily lives, and offer great potential for an Internet-wide, people-centric ecosystem

that will considerably extend human capabilities in acquiring, consuming and sharing personal information. In particular, these new capabilities will address a vital aspect of living – the practice and implementation of personal health care and well-being. Humans are actually becoming super organisms with support from this ecosystem. For

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instance, with the latest mobile devices we will be able to see and review our personal health status through backend analysis services using continuously collected data from those wearable body sensors; we could make complex decisions using our computing-aided “brains.”

People have always been searching for the most accurate information to empower themselves for a healthier life. Social media has changed the nature of interactions among people and organizations. According to PwC’s consumer survey of 1,060 U.S. adults, about one-third of consumers are using the social space as a natural forum for health discussions (Admins, 2011). We share our lives and thoughts with the social community or the public. We depend on our networks to help us make many decisions. We seek connection and access. However, the health and wellbeing industry has been slow to embrace social media due to often insurmountable issues of privacy, data protection, but now is beginning to see the benefits.

Meanwhile, the rapidly growing popularity of smartphones and tablets globally has created many opportunities for growth within the health care and wellbeing sector. These devices provide new ways to gather information, both manually and automatically, over wide areas. Many current smart phones come with a number of embedded sensors such as microphones, cameras, gyroscopes, accelerometers, compasses, proximity sensors, GPS and ambient light. The newer generation of professional wearable medical sensors can easily connect with the smart phones and transfer the sensing results directly. This has provided a more efficient and convenient way to collect personal health information like blood pressure, oxygen saturation, blood glucose level, pulse, Electrocardiogram (ECG), Electroencephalogram (EEG) and electrocardiography (EKG). A future in which we are all equipped with devices and sensors that passively collect and interpret our health and activity data is not too far off. The scale and richness of mobile sensor data being

collected and analysed are rapidly expanding. This massive growth creates both data manageability and collaboration challenges.

Traditional sensor network systems increasingly face many issues and challenges regarding their communication and resources management including data storage, data query, data processing, privacy control, and data sharing. The emergence of cloud computing is seen as a remedy for these issues and challenges. Implementing cloud computing technologies appropriately can help healthcare providers improve the quality of medical services and the efficiency of operations, share information, improve collaboration, and manage expenditures.

In this chapter, we present our work – a service platform named Wiki-Health that takes advantage of cloud computing and Internet of things for personal well-being data management. Wiki-Health is a social platform for data-driven and context-specific discovery of citizen communities in the areas of health, fitness and well-being. Wiki-Health provides new ways of storing, tagging, retrieving, analysing, comparing and searching health sensor data. It makes health-related knowledge discovery available to individual users at a massive scale. Wiki-Health is based on the concept of the wiki and mass collaboration, according to which aggregated user-contributed content is collectively curated to produce unprecedented volumes of knowledge in a multi-perspective and socially engaging way. One of key research points for Wiki-Health is to deliver novel algorithms for data-driven community discovery in large health datasets.

BACKGROUND

The growing global popularity of smartphones and tablets has resulted in new ways to gather information, both manually and automatically by means of an array of embedded sensors. Professional wearable biosensors easily connect to smart

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