Chapter 46
Big Data in Healthcare and Social Sciences:
Bip4Cast as a CAD System

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ABSTRACT

Healthcare providers and payers are increasingly turning to Big Data and analytics, to help them understand their patients and the context of their illnesses in more detail. Industry leaders are exploring/using Big Data to reduce costs, increase efficiency and improve patient care. The next future is an innovative approach to improving patient access using lean methods and predictive analytics. Social sciences are very much related to healthcare and both areas develop in a parallel way. In this article, we introduce one example of application: Bip4cast (a bipolar disorder CAD system). This paper shows how Bip4cast deals with different data sources to enrich the knowledge and improve predictive analysis.

INTRODUCTION

Healthcare providers and payers are increasingly turning to Big Data and analytics, to help them understand their patients and the context of their illnesses in more detail. Industry leaders are exploring/using Big Data to reduce costs, increase efficiency and improve patient care. The next future is an innovative

approach to improving patient access using machine learning methods for predictive analytics (Geddes & Miklowitz, 2013) (Groves, et al. 2013).

Social sciences are very much related with healthcare and both areas develop in a parallel way. Medical and social information databases are actually increasing at every moment but they lack a methodology to gather the information and are unconnected. This absence of connectivity leads to non-concrete solutions provided by doctors, social care systems, policy makers, etc. Big Data systems will bridge the gap to this disconnection by providing a holistic information model gathering, collecting and analysis, providing a multi angle perspective solution to different stakeholders (Bonsall et al., 2015).

Nowadays, the trend is to understand as much as possible about a patient and as early as possible in their life, hopefully picking up warning signs of serious illness at an early enough stage, so that treatment is far simpler and less expensive than if it had been noticed at a later stage. In this way Big Data in healthcare starts at the beginning, before we even get ill.

Some years ago, smartphones were just the starting point to Big Data in healthcare. They started by developing apps enabling you to measure how far you walk in a day, to count how many calories you have burnt, to plan your diet and much more. Millions of users are now using daily mobile technology to help healthier lifestyles. A very good example of these apps is Walking People or WAP, which is an app, developed by our group (GRASIA/G-TeC) in collaboration with Madrid City government to measure and encourage the health of citizens who walk in Madrid City. G-TeC group has also some related background and experience in these kind of developments (Farias, Santos & López, 2010), (Martín, Santos, López & Botella, 2012), (Soto, Robles-Baldenegro, Lopez, & Camalich, 2016), (López, Valverde, Anchiraico & Urgelés, 2016).

In the very near future, one could also be sharing this data with his or her doctor who will use it as part of his or her diagnostic CAD system for illness or crisis diagnosis. Even if there is nothing wrong with the user of the system (everyone in the near future), access to huge and growing databases of information about the state of health of the general public (as well as individual data) will allow problems to be spotted before they occur, and then, medicinal or educational remedies can be prepared in advance. This theory follows the dogma 'Prevention is better than cure', which is a debatable idea of a healthy society which drives an unsustainable amount of the population within the system (pension system unavailable to maintain retired and older people).

This is lead often by partnerships between medical and data professionals (data scientists and/or Big Data technicians) with the potential to peer into the future and identify problems before they happen or just build systems for facilitating this kind of knowledge discovery. One example is OECD proposal, which aims to take data from various different sources (medical records, wearable sensors, genetic data, insurance records, and so on) and build an open platform of data about dementia and neurodegenerative disease useful for hospitals, institutions and governments (OECD, 2015).

Big technology companies are also interested in healthcare future. Apple and IBM have just announced their partnership for collaboration on a Big Data health platform that will allow iPhone and Apple Watch users to share data with IBM's Watson Health system by means of their cloud healthcare analytics service. The aim is to discover new medical insights from monitoring real-time activity and biometric data from millions of potential users. This enables predictive modelling to take place, allowing doctors to assess the likely result of whichever treatment they consider prescribing (having taking into account the data from other patients with the same condition, profile, genetic factors and/or lifestyle).

This article is organized as follows. After this introduction, a literature review section is shown. Next section shows the project Bip4cast as CAD system (predictive diagnosis) for bipolar disorder. This

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