

Panimalar Engineering College
Department of Electronics & Communication Engineering
IBM Nalaiya Thiran
Literature Survey

Title : Analytics for Hospitals' Health Care Data

Domain : Data Analytics

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ABSTRACT

The current study performs a systematic literature review (SLR) to synthesise prior research on the applicability of big data analytics (BDA) in healthcare. The SLR examines the outcomes of 41 studies, and presents them in a comprehensive framework. The findings from this study suggest that applications of BDA in healthcare can be observed from five perspectives, namely, health awareness among the general public, interactions among stakeholders in the healthcare ecosystem, hospital management practices, treatment of specific medical conditions, and technology in healthcare service delivery. This SLR recommends actionable future research agendas for scholars and valuable implications for theory and practice.

INTRODUCTION

Healthcare enterprises search for suitable technologies to streamline resources for the sake of improving the patient experience and organisational performance (Tang et al. 2019; Wang, Kung, and Byrd 2018; Tandon et al. 2020). Healthcare can be conceptualised as a system comprising three constituent parts: (a) core providers of medical care services, such as physicians, nurses, technicians, and hospital administrations (Boudhir, Ben Ahmed, and Soumaya 2017; Zhang, Simon, and Yu 2017); (b) critical services that are associated with medical care services, such as medical research and health insurance (Austin and Kusumoto 2016; Chandola, Sukumar, and Schryver 2013); and (c) beneficiaries of medical care services, i.e., patients and the public (Salomi and Balamurugan 2016; Weng and Kahn 2016). This study considers that a healthcare system includes contact-based and technology-based remote monitoring services extended by constituent service providers to promote, maintain, or restore the health of beneficiaries (George, Chacko, and Kurien 2019; Kaur, Sharma, and Mittal 2018). Big data analytics (BDA) has had a considerable influence across healthcare functions.

METHODOLOGY

The protocol for the current SLR, as presented in Figure 1, is comprised of three sequential processes: planning the review, performing the review, and presenting the review (Behera, Bala, and Dhir 2019; Tandon et al. 2020). The present SLR includes preset inclusion and exclusion criteria (see Figure 1), as recommended by prior literature (Behera, Bala, and Dhir 2019; Tandon et al. 2020).

Hospital management

Applications of BDA have the potential to derive reliable insights for specific beneficiaries in healthcare, including hospital administrators, doctors, and nurses. BDA can serve to help hospital administrators in resource allocation (Agnihotri et al., 2015; Jindal et al. 2018), doctors in patient profiling (Narayanan and Greco 2016; Lin et al. 2017), and nurses in providing disease-specific patient facilitation (Boudhir, Ben Ahmed, and Soumaya 2017; Moreira et al. 2018). For instance, hospital management may dynamically allocate resources for treating the Covid-19 patients by using BDA-based insights from data on confirmed cases, population density, demographics, and migration flow.

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Customised care

Patients are often key beneficiaries of insights derived from BDA. BDA can aid in providing personalised care to patients by controlling medications (Christensen et al. 2018; Wang, Kung, and Byrd 2018), predicting diseases (Tseng et al. 2017; Wang, Kung, and Byrd 2018), and supervising patients (Jin et al., 2016; Shao et al. 2016). The rapid spread of Covid-19 has threatened to overwhelm health systems across the world, forcing hospitals to defer scheduled surgeries and treatments for an unknown period. A BDA-enabled smartphone application may conduct a personalised risk assessment of patients awaiting surgeries, provide suggestions to address minor health complications, and prioritise patients based on the urgency in the requirement of medical attention from doctors.

Problems in health data accumulation

Prior research observed several issues related to big data accumulated in healthcare, such as data quality (Sabharwal, Gupta, and Thirunavukkarasu 2016) and data quantity (Gopal et al. 2019). However, there is a lack of research into the types of problems that may occur during data accumulation processes in healthcare and how these may arise from a variety of sources, such as diagnostic reports, hospital registers, and patient history. Future research should look into addressing this research gap and find solutions to the identified problems. This set of future research agendas reinforces future research scope of improving methodological rigour

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