


Chapter 1

Advances for Artificial Intelligence in Health Data Analytics to Drive Digital Systems Innovation

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ABSTRACT

Artificial intelligence in health (AIH) and health data has become a focus of attention for customers of health services, organizations providing health services, and the government organization monitoring the performance and outcome for health services. These three groups have vested interests in how, where, and when the health data can be used and delivered to facilitate and streamline the delivery and process for health services from adopting AIH. The driving force in AIH for health data analytics stems from the discovery of new information, analysis that seeks to provide a clear understanding of a problem, interpretation in making clear sense of the problem, and communication of meaningful data patterns that can be effectively used in finding solutions to drive digital systems innovation. Modern technology provides an important platform for the health data transformation at different stages of the process to deliver different kinds of health services adopting artificial intelligence.

INTRODUCTION

Digital technologies such as Artificial Intelligence (AI) can offer limitless possibilities to improve health services, from personal fitness to building stronger health systems for entire countries (Dzenowagis et al 2018, World Health Organisation). Despite the opportunities for Artificial Intelligence in Health (AIH) to solve many problems, the development and application of AIH has been very limited. The reasons for that are AIH is a time consuming, expensive, experts from health & IT having very limited or no understanding of where and how it can be applied to solve problems, and also the lack of medical and

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healthcare data analytics that is needed for functioning AI systems. Consumers of healthcare services have raised important concerns: about their health information privacy, and access to the personal data, use of health data by institutions such as health insurance companies, unauthorized access to medical data and records, and cybersecurity. Jiang et al. (2017) argue that Artificial intelligence (AI) aims to mimic human cognitive functions. It is bringing a paradigm shift to healthcare, powered by increasing availability of healthcare data and rapid progress of analytics techniques.

In a case study by Anderson and Anderson (2019) it was discovered that Automation bias refers generally to a kind of complacency that sets in when a job once done by a healthcare professional is transferred to an AI program. The authors see nothing ethically or clinically wrong with automation, if the program achieves a virtually 100% success rate. If, however, the success rate is lower than that—92%, as in the case presented—it's important that there were assurances that the program has quality input; in this case, that probably means that the AI program “learned” from a cross section of patients of diverse ages, gender, and races.

Digital Systems Innovation for Health Data Analytics have faced obstacles in systems implementation & consumer acceptance of AI health services. Research suggests that digital health innovation has been a challenge and a slow process for acceptance when AI is not finely tuned to deliver specialized health services. At the same time AIH offers tremendous opportunities in Health Data Analytics for consumers of health services & service providers, such as health information portability, personalization of health information by consumers, easy access and usefulness of health information, better management of data records by institutions & government, and management of information by healthcare staff for patients' engagement and care. AI for Health Data Analytics is the key for driving a Digital Systems for Health Innovation. This research seeks to identify the digital health innovation opportunities and obstacles adopting AIH, develop a framework & a conceptual model for digital health innovation, that empowers consumer of digital health to use AIH to make informed decisions and choices.

DIGITAL SYSTEMS INNOVATION FOR HEALTH DATA ANALYTICS ADOPTING AIH

Researchers have long argued that the adoption rate of Electronic Health Record (EHR) systems is an important indicator of the degree of national e-health (Bonomi 2016). More recently advances have been made adopting AIH to d-health systems. This is also a measurement in the success of creating, sharing, distribution, of data analytics. Health Data is essential for digital innovation systems to function. Hambleton and Aloizos (2019) argue that the healthcare industry is one of the last industries to be disrupted by digital technologies especially focusing on AIH. It arguably has the most to gain, particularly from timely, accurate communication and clinical improvements, especially medication safety adopting AIH. At a time when governments of different countries willing to provide quality healthcare to their citizens on a digital platform, AIH can provide innovative solutions to severe healthcare problems. For example: Singapore government have made digital health a top priority for their citizens (RIE2020). Jha et al. (2008) state that health information technology in general and EHRs in particular, are tools for improving the quality, safety and efficiency of health systems in countries. They observed that in UK, Netherlands, Australia, and New Zealand generally used EHRs among general practitioners (each country >90%); Germany was far behind (40–80%); and there was a small minority of doctors in the U.S. and Canada who used EHRs (10–30%). They also explained that it is difficult for hospitals to obtain quality data

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