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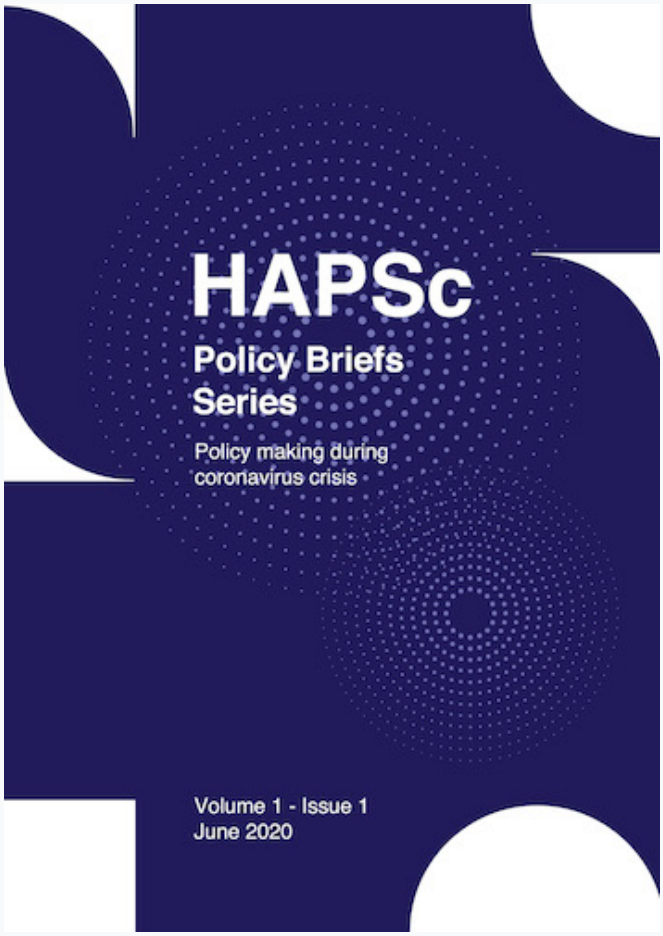

AI transforming Healthcare Management during Covid-19 pandemic

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AI transforming Healthcare Management during Covid-19 pandemic[1]

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Abstract

The dawn of artificial intelligence (AI) as a platform for improved health care provides unparalleled opportunity to enhance patient and clinical team performance, minimize costs, and reduce the health effects of the community. It provides a broad description of the legal and legislative context of the AI tools intended for the implementation of health care; highlights the need for equality, accessibility, the need for a human rights goal for the work; and identifies important factors for further advancement. AI framework describes the obstacles, drawbacks, and best practices for AI development, adoption, and management. It brings in a paradigm shift to healthcare, driven by rising clinical data access and rapid advancement in analytical techniques. Artificial Intelligence (AI) is going to revolutionize the practice of medicine and change the delivery of healthcare. This paper discusses the role of artificial intelligence in the advancement of health care and associated fields. It also discusses, the value of artificial intelligence in various healthcare sectors' transformation.

Introduction

Background

Artificial intelligence (AI) is a broad term that encompasses a range of technologies (many of which have been under development for several decades) that aim to use human-like intelligence for solving problems (Simonite, 2017). In the healthcare domain, these expert systems have been designed by clinicians working with programmers. Another approach to AI is the use of machine learning (ML)

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techniques including artificial neural networks (ANNs). Using an ANN approach, computer programmes create decision-making networks of artificial "neurons" that operate in ways similar to biological nervous systems (Zheng, He, and Congdon 2012). For image processing and interpretation for radiology, dermatology, and pathology, as well as for enhancing the depth and precision of biomedical signal interpretation, ML-powered clinical decision support systems (CDSSs) were proposed for health care (Golub, 1999; Russell et al., 2010). In recent years AI has a gradual use in several sectors such as on robotics and AI implementations on healthcare industry and medicine. Other paradigms that we can observe from sectors can include AI technologies in the public sector, emerging artificial intelligence methods for deep conflict resolution and humanitarian response to conflict resolution, consultation, lobbying, mediation, peacekeeping, crisis management etc. (Efthymiou et. al. 2020).

Healthcare safety

Safety and security are a vital sector in health care. The healthcare environment will require a high degree of transparency, validation, and safety evaluation before AI-based technologies are introduced relative to low-risk technology and programmes such as AlphaGo and IBM Watson. Artificial intelligence (AI) has immense potential to enhance health care efficiency, from increasing diagnosis specificity to the optimization of patient preparation to anticipating results of treatment. However, incorporating AI technology into the provision of healthcare is likely to add and intensify a variety of new risks. Infirmities in the underlying data and frameworks can lead to dangerous recommendations for AI systems which are inadequate to local treatment processes and intangible approaches of AI such as deep understanding can make explaining and learn about problems quite difficult to optimize. For instance, software errors and errors in AI will easily impact vast numbers of patient's safety and security. These problems include the discrepancy between the data a system is trained on and the environment it needs to make predictions and the complexities of understanding and explaining how machine learning systems make predictions (the 'black box' problem). In the long run, the researchers point out the possible consequences in the area of AI protection of certain basic technological problems being tackled. This include, for example, autonomous systems that independently find new ways of achieving the text and letter, but not the essence, of the intended goal (the 'reward hacking' problem) and, in doing so, causing unintended harm (Yu et. al., 2018).

Developing AI research and analytical framework

Responding to different concerns would demand the creation of a large theoretical and analysis context that not only covers but also reaches well beyond the technical problems inherent in the

application of particular algorithms. It may include looking back at the realistic tasks of identifying, designing, evaluating, and applying models and data that underlie AI systems. And it will mean looking ahead to the operational and structural environments in which AI technologies can be embedded — which will often struggle to do so. Understanding these decisions and the human and operational mechanisms that govern them is essential to the creation of a holistic image of the protection of the AI environment. It will therefore be necessary for health science and policy to both relate and benefit from these wider studies and debates on AI protection and governance. By drawing attention to some of the main technical challenges raised by machine learning, researchers are making a significant move forward and helping to launch a fresh dialogue on the regulation of AI protection in healthcare. Medicine was listed as one of the most promising fields of operation for AI. The need for a large network of analysis and analytical mechanisms is demanded immediately (Yu et. al., 2018).

Artificial intelligence and health information management (HIM)

Health information technology has had a major influence on the health information management (HIM) field. HIM experts are members of the Allied Health Network and promote efforts to ensure the transparency, precision, quality, and reliability of health records. The central duty of the HIM profession is to ensure that the right knowledge is given to the right individuals to deliver quality health care (Dimick, 2012). The digitization of health data has had a huge effect on the duties and work of HIM practitioners, prompting them to take on more specialized tasks in gathering, preserving, and using health data. Healthcare is going through an awareness explosion. "The exponential growth of scientific knowledge and the acceleration of technical progress has culminated in a large array of data that is difficult to decode and implement." Physicists are immersed in data that demand much more complex analysis, but they are nevertheless required to perform efficiently. The claim that AI will "increase decision-making by clinicians by uncovering clinically important knowledge hidden in a vast volume of data" is highly appealing, particularly now that expert clinicians are in short supply all over the world (Ganapathy, Abdul, and Nursetyo, 2018; Miriovsky, Shulman, and Abernethy, 2012).

AI and clinicians

According to the Canadian Association of Radiologists, "there is evidence that AI can enhance the efficiency of clinicians and that both clinicians and AI work together are better than one of them alone". Indeed, AI technology is required to achieve the "precision medicine" objective. Precision medicine is an evolving medical paradigm where medical procedures and therapies are personalized

to the patient's needs. "Precision medicine presupposes the existence of vast processing resources and algorithms that can learn on their own at an exponential pace". Increased recognition of AI-enabled technologies and more advanced use of AI solutions by healthcare professionals at the point of treatment have important consequences for HIM procedures. This includes functional consequences for common HIM procedures, such as medical coding, as well as, more broadly, core HIM responsibility for handling health data and knowledge. Each use case provides explanations of the expected application of AI, addresses the related effect on current HIM processes and procedures, and examines potential possibilities and obstacles for integrating HIM procedures. The enhanced awareness of AI-enabled software and the increasingly advanced use of these AI applications by healthcare professionals at the point of treatment have functional consequences for data management (Ganapathy, Abdul, and Nursetyo, 2018; Tang et al. 2018).

Future of AI

Future data will not be gathered exclusively within the framework of the health care environment. The proliferation of mobile sensors will enable future physicians to track, analyze, and respond to additional streams of biomedical data obtained remotely and automatically. These technologies have been under development for a number of years. More than five years back, a blood pressure cuff that attaches to a smartphone and transmits data to a health care provider was available 36 years ago. Tools are now available that monitor glucose levels, have electrocardiogram measurements, or also capture human cognitive and mental wellbeing tests. If wearable sensors advance, they will eventually allow for continuous and discreet tracking of precise health parameters. They can replace widely worn items, such as watches, worn under standard clothing, or even incorporated into "smart" clothing. These types of devices can conceivably relay data back to the healthcare provider, potentially directly to the EHR, which poses numerous challenges. It would be important to trace the origins of these data as the quality, reliability, and therapeutic importance of the data can be unknown (Stanfill and Marc, 2019).

AI linked with some more advances and transformation

As Francis Collins proposed in his vision of the Precision Medicine Initiative, the next generation of scientists would "create innovative new methods for the identification, assessment, and study of a wide variety of biomedical knowledge – including genetic, biochemical, cellular, biological, behavioral, physiological and environmental parameters." Conventionally, we generally speak about the importance of maintaining the confidentiality and privacy of health data, including data relating

to specific patients (Collins and Varmus 2015). It has been shown that small variations in the lab values in the patient's EHR will fully modify the mortality prediction made by what is essentially a well-trained predictor; (Wang et. al. 2019).

How can AI transform healthcare?

Humans and robots each have their own particular strengths and disadvantages, and they should support each other by delivering and maximizing healthcare. The opinion of the American Medical Association stresses the relationship between man and machine, which has significant consequences for the application of AI in healthcare. Artificial intelligence can be used as an effective instrument and allies to improve, develop, and extend human capacities, provide the kinds of treatment people require at the time and where they need. AI will form an alliance to increase therapeutic outcomes (i.e. efficacy, safety, and feasibility), availability, and affordability of treatment. For activities where the computer has improved human competence (e.g. cancer detection, diabetic retinopathy, and some cardiac conditions), for activities where mistakes do not contribute to significant effects (e.g. vaccination to an at-risk demographic group), or for cases when medical physicians are unable but the software may do a decent job (e.g. using a chatbot to teach a patient how to administer an insulin injection). The effective use of AI in healthcare demands that AI systems be incorporated into workflows to facilitate clinical decision-making at the point of treatment. There is a fast-growing number of businesses, especially start-ups, which are developing numerous types of AI healthcare applications. Such systems typically fall into one of four categories: patient-facing, doctor-facing, science, and telehealth. Mayo Clinic Neuroradiologists use AI to identify molecular biomarkers in magnetic resonance imaging scans instead of samples obtained during surgery. Researchers at the Memorial Sloan Kettering Cancer Center have developed a deep learning model and framework that uses only the recorded diagnostics as labels for full-slide picture processing while eliminating manual annotation of broad data sets that other deep learning models need (Eggerth et. al, 2020).

AI and its applications in COVID-19 pandemic

AI will easily identify unusual signs and other 'red flags' and therefore alert patients and health authorities. It helps facilitate quicker decision-making and is cost-effective. It helps to build a new diagnostic and control system for COVID 19 cases, using helpful algorithms. AI will create an intelligent network for automated detection and prediction of the dissemination of this virus which will also care in the careful diagnosis and care of infected individuals (Ai et al. 2020). AI can help determine the extent of transmission of this virus by recognizing clusters and hot spots and can

effectively detect and monitor the interaction of individuals. This technology can detect and model the existence of the virus from the available data, social media, and media outlets, the threats of the outbreak, and the possible distribution of the virus. AI is used for drug testing by evaluating the available data for COVID-19. It is important for the design and production of drug delivery. This technology is used to speed up drug testing in real-time, where normal monitoring takes a lot of time and thus helps greatly accelerate this process, which would not be feasible for humans. AI can help assess the degree of dissemination of this virus by recognizing clusters and hot spots and can accurately diagnose and track the presence of individuals. This technology can identify and model the presence of the virus from the available data, social media and media sources, the threat of the epidemic, and the potential spread of the virus. AI is used for drug testing by analyzing the evidence available for COVID-19. It is important for the design and manufacture of the delivery of drugs. This system is used to speed up drug testing in real-time, where routine tracking takes a lot of time and thus helps massively accelerate this process, which would not be possible for humans (Aw and Am 1989; Li et al. 2020). AI will have an effect on prospective health care and solve more emerging issues that will the workload of physicians. With the support of a real-time data collection, AI may provide up-to-date information that helps deter this disease. In the future, this will become an important tool for fighting other epidemics and pandemics. It will provide a prevention measure and tackle many other diseases. AI will play a vital role in delivering both predictive and preventive healthcare in the future (Vaishya et al., 2020).

AI and Urban Health Data

However, while recognizing the value of the data industry, concerns such as anonymity, data security and distribution, and legal standards for health care management and surveillance, among others, remain important. While the usefulness of such data for enhancing performance, competitiveness, and processes in various fields is celebrated, there are critiques of the essence of data processing, storage, maintenance, and usability for such a small number of consumers. These associated benefits of big data clearly influence the geopolitical position, both in corporate and traditional governance, and there is increased competition between powerful economies to ensure that they have maximum control over big data. These are known to be coveted symbols on the world map, and it is expected that these systems will continue to work for their overarching influence as much as possible in the health sector, the same strategy is retained where vital knowledge and data are not openly exchanged between economies as would be expected to support most dynamic economies, although different economies will support from leveraging the value of such data collections (Kharpal, 2018).

Besides, both the new demographics of health, disease and decease patterns have changed as a part of broad of changes such as the population growth, the urbanization, the flee of refugees (as we know populations on the move face multiple health risks, because they are unsheltered to risk factors and affect the health of other refugees and immigrants as well as the reception country) are the factors shaping the future health care system (Fouskas et. al., 2019; Kotroyannos et. al., 2019; Vozikis et. al., 2020). As Eftymiou, Vozikis and Sidiropoulos has mentioned those changes in social, economic, political and demographic differences creates the need for development of health systems. The health sector has been characterized by the laws of supply and demand. The progress of computing, robotics and artificial intelligence strengthens the idea that humanity is heading into a new era. Positive benefits could also stem from the cooperation of states and organizations on a global level and by using technological achievements, ai, big data, ehealth, mhealth apps, can be the way to ameliorate the quality of services and to deal with new challenges that will arise in the health sector (Efthymiou et. al., 2019; Sbarouni et al., 2020).

Conclusion

AI-powered technologies have taken incremental strides in solving critical problems, but have yet to make a significant aggregate impact on the global healthcare market, considering the considerable media coverage that surrounds it. With a multitude of problems to be addressed, motivated by well-documented trends such as an ageing population and increasing prevalence of chronic illness, there is a strong need for new creative innovations in healthcare. Early detection of various chronic diseases by artificial intelligence helps in early initiation of the treatment for it, which slowdowns the disease progression, improves patient's quality of life, and further reduces the economic burden involved in healthcare management (Efthymiou, 2016). It is very important to continue the development of these methods which gives the right direction for research in near diagnosis of various chronic diseases. AI will promote changes in health quality, patient engagement, and access to healthcare services. It will improve the effectiveness and quality of healthcare services and allow health care facilities to offer more and more treatment and management to more patients. AI will help enhance the perception of healthcare professionals, allowing them to devote more time to direct patient care and management. The artificial intelligence has recently been advertised as one of the main technologies contributing to a real step forward in the administration of health care and services. Diagnostic and healthcare management is often known to be a laborious and exhausting operation, so new artificial intelligence technology is creating technologies and methods to support and overcome health management problems. If the main issues can be tackled in the coming years, it will play a leading role in the

potential operation of healthcare management, growing clinical capital, and ensuring optimal patient outcomes.

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