Artificial Intelligence For Healthcare: Insights From India

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Abstract

The paper strives to give policymakers a comprehensive understanding of the problems surrounding the use of artificial intelligence (AI) in the Indian healthcare industry. This study suggests changes to policy areas related to AI in healthcare and identifies government initiatives, opportunities, and challenges for AI applications using a qualitative approach. The study contributes comprehensively to the formulation of AI policy for the Indian healthcare sector. Additionally, the study emphasizes that the healthcare sector will greatly benefit if the government takes the appropriate steps to address the different obstacles related to AI applications in India. Using various AI applications, this article has attempted to offer insights on policy initiatives, obstacles, and suggestions for enhancing India's healthcare system.

Keywords: *Artificial Intelligence, Healthcare, India, Robotic solutions, Ethics, Law, Policy, and Suggestions.*

Introduction

AI is the application of computer software routines (algorithms) that have been coded with precise instructions to carry out tasks that are typically thought to require a human brain. People can use such software to identify objects, comprehend and process language, identify sounds, and solve problems by applying learning patterns. The process of continuously improving an algorithm is called machine learning (ML). The algorithm can be modified to increase the artificial intelligence's precision through the use of vast amounts of data and an automated refinement process (Zandi, 2019). In short, AI allows computers to simulate intelligent behavior with little assistance from humans and has been demonstrated to perform better than humans on particular tasks.

Deep neural networks, a subfield of artificial intelligence, were reported to have been used to diagnose diabetic retinopathy (DR) from retinal images and to analyze skin cancer images more accurately than a dermatologist in 2017 (The Lancet, 2017).

But the meaning of artificial intelligence is changing. In addition to the more technical definition mentioned above, artificial intelligence (AI) is thought of as something that resembles human intelligence and aims to surpass the capabilities of any one of the individual technologies. The idea is that a machine can perform a task that "feels" human thanks to a technological interaction. A machine's

capacity to carry out any task that a human can accomplish is known as artificial general intelligence (AGI).

The human brain serves as a model for AGI systems. AGI has not yet been realized, though; according to recent predictions, it will appear by 2060 (Joshi, 2019).

The case for analyzing the possible benefits and hazards of using AI systems in healthcare has gained additional significance since the COVID-19 virus outbreak in early 2020, which sparked an unprecedented global public health emergency. In addition to predicting new COVID-19 hotspots and transmission trends, AI systems could be a vital tool in the hunt for medication treatments or vaccines, as well as assist overworked health administrations with resource planning and optimization. But as governments everywhere rush to implement technological solutions—many of which depend on machine learning (ML) systems—to help them contain and lessen the crisis, concerns about the governance and ethics of AI are also becoming more pressing.

In addition to highlighting the power and influence of so-called "big tech" companies, there are already growing concerns about how the current crisis will increase governments' surveillance capabilities. These are especially serious issues for developing nations like India. The allure of AI-based solutions is growing in these nations due to their inadequate public health infrastructure, despite the fact that the legal and regulatory frameworks needed to guide AI's course are inadequate and undeveloped.

The key benefits and difficulties of applying AI in healthcare are discussed in this paper. After that, it discusses important applications, difficulties, and dangers in the context of a case study of AI's use in healthcare in India.

AI for Health Care

According to four suggestions made by the World Economic Forum, artificial intelligence (AI) can improve healthcare efficiency and affordability: allowing for more individualized treatment plans that will enhance patient outcomes and, consequently, lower the cost of treatment-related complications; facilitating earlier and better diagnosis that minimizes human error; facilitating accelerated drug development; and enabling patients to take a more active role in their own health management (World Economic Forum, 2018). The potential cost savings that AI could provide to the healthcare industry is one of its primary draws. By 2026, a study by Accenture estimates that the US healthcare economy could save $150 billion annually as a result of the integration of important clinical AI applications.

By reducing avoidable and correctable system inefficiencies (like overtreatment, inappropriate care delivery, or even care delivery failures), artificial intelligence (AI) can contribute to significantly more efficient and economical health ecosystems (Accenture, 2017).

The release of healthcare professionals from routine data work would be an additional advantage of implementing AI in healthcare settings. By leaving the task of reviewing and analyzing clinical data to technology, they would be able to concentrate more on patient care. Healthcare professionals could, for instance, evaluate patients more precisely as a result, leading to quicker and more precise diagnoses.

A diagnosis that would have taken a doctor (or a group of doctors) many hours to arrive at can be made by AI. In a fraction of the time required for a human expert to complete the same task, it can process a vast number of medical images and scans. AI is already transforming radiology in this way by

enhancing workflows and providing imaging and diagnostic support.

Similar to this, using AI for administrative tasks will free up resources that could be used for treatment delivery, the development of novel medications and treatments, and disease-eradication research.

In addition to reducing human errors in medical practice, doctors, nurses, and other healthcare professionals will be freed from taxing tasks that lead to burnout (Ash, Petro, and Rab, 2019). For instance, NLP is utilized in the analysis of unstructured clinical notes, report preparation, and patient interaction transcription. Robotic process automation, which actually uses computer programs on servers instead of robots, is used for repetitive tasks like billing, updating patient records, and prior authorization, which is necessary for some health insurance plans (Davenport and Kalakota, 2019).

The Value of Robotic Solutions

It is hoped that expensive and extremely complex AI applications, like robot-assisted surgery, will eventually be available to low- and middle-income countries (LMICs). Healthcare systems in low-resource environments are currently facing shortages in personnel, medical supplies, and other infrastructure. However, AI tools have the potential to solve the shortage of workforce resources, maximize current resources, and significantly improve healthcare outcomes and delivery in ways that were previously unthinkable (USAID, 2019). Some believe that using machine learning (ML) to extract more value from the data that is currently available is the greatest immediate benefit of AI in LMICs. In LMICs, some important uses of AI for health are anticipated to improve healthcare quality and expand access.

These initiatives center on population health monitoring and assessment, focusing public health interventions for greater impact, empowering frontline health workers, including community health workers, to better serve their patients through AI-powered tools like smartphone apps, creating virtual "health assistants" who can help patients manage their conditions or know when to seek care, and creating tools to assist physicians in diagnosing and treating their patients (Roy, A. 2017)

Through data science, a multidisciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from structured and unstructured data, artificial intelligence (AI) is being used in a variety of therapy areas, such as wearables, virtual assistants, wellness and lifestyle management, diagnostics, and disease surveillance to predict, model, and slow the spread of disease in epidemic situations, including in settings with limited resources (Saha, T. (2018).

In the Philippines, for instance, an ML tool has been used to detect land-use and weather patterns linked to the spread of dengue fever, a mosquito-borne illness that has recently spread quickly throughout the world (Wahl et al., 2018).

AIME (Artificial Intelligence in Medical Epidemiology), a US-based company, created the AI machine, which can increasingly predict the occurrence of dengue. Two states in Malaysia, Singapore, the Dominican Republic, and Rio de Janeiro have all implemented AIME's technology. When the next dengue outbreak occurs, the platform notifies users three months in advance of the precise location and date of the outbreak. According to the World Wide Web Foundation (2017), its personalized analytics platform also interprets the public health data of its users and offers time charts, historical disease mapping, and "rumor reports" from social media.

At Policy Level

These new sciences have the potential to help with health policy decision-making, improve healthcare's integration with other sectors, and save a significant amount of time and money when conducting research and advancing quality improvement initiatives (Colclough et al., 2018). The use of AI to process the datasets related to these cases promises to be extremely beneficial at a time when restructuring health systems is becoming more and more necessary to address the new issues posed by an aging and expanding population that is afflicted with a variety of medical conditions.

One of artificial intelligence's main advantages is its high speed at processing and analyzing data. As more nations refine their electronic medical records (EMR) and health informatics, artificial intelligence (AI) will be in greater demand. According to ibid., between 30 and 60 percent of Indians have stated that they would like their health data to be shared in order to enhance care delivery, enable research, and guide health planning. In Kenya, an open EMR platform has helped to improve HIV/AIDS treatments in rural areas and maternal and child health by facilitating more thorough data collection. Western Kenya began using the cloud-based EMR system in 2013.

The system's implementation improved the completeness of data (such as screening for HIV/AIDS status, malaria, TB, hypertension, or antiretroviral therapy (ART) status of women with HIV) by 42.9%, according to a study's findings (Haskew et al., 2015).

By using natural language processing (NLP) technologies, machines can recognize important words and phrases and deduce the meaning of text. For instance, voice-to-text dictation and clinical documentation are made easier with the use of NLP algorithms. Because they enable them to communicate with patients and create precise consultation records without having to type simultaneously, these technologies are becoming more and more popular among healthcare professionals who are struggling with electronic health record (EHR)1 overload.

Google Home and Alexa, two of their well-known ambient home computing devices, are being investigated by both Google and Amazon as potential novel healthcare "assistants." For example, in May 2018, it was reported that Amazon was going to use Alexa for home care and chronic illness management (Health IT Analytics, undated). NLP is also being used to direct cancer treatments in low-resource countries, such as Thailand, China, and India, where AI mines patient records and medical literature, including lab results and doctor's notes, to offer treatment recommendations (Wahl et al., 2018).

The potential for leveraging increasingly sophisticated health-focused IT tools, like natural language processing, to enhance the care continuum is only going to grow.

AI and related technologies have the potential to help healthcare systems overcome challenges in resource-poor environments. AI has many opportunities to improve both individual and population health, thanks to factors like high mobile phone penetration, cloud computing advancements, significant investments in digitizing health data, and the emergence of mobile health (mHealth) applications.

Challenges related to ethics, law, and other aspects of using AI in healthcare

It is anticipated that AI applications, in conjunction with big data and robotics technologies, will have revolutionary and disruptive potential in the healthcare industry. This includes a variety of domains, including hospitals and hospital administration, pharmaceuticals, insurance, mental health and well-being, and predictive and preventive medicine. But because of the new risks and difficulties these applications bring, institutional and policy frameworks will be needed to direct the development and application of AI. Individual challenges are the main focus of this paper.

As health data becomes more accessible and AI is used to analyze it for medical purposes, questions pertaining to ethics, technology, and resources will need to be addressed.

The issues of quality, safety, governance, privacy, consent, and ownership remain unresolved. Another worry among those who study AI design and application is that humans must comprehend how and why AI made a particular choice. The methods AI uses and how quickly it processes vast amounts of data are incomprehensible to humans. It is difficult to analyze many of the algorithms developed by machine learning, and it is impossible to pinpoint exactly how and why AI reached a particular conclusion. It is difficult to completely trust AI systems when there is a lack of explainability and confidence in AI procedures (Schmelzer, 2019).

Those who handle sensitive data for AI purposes have a major responsibility to protect citizens' health information. Policymakers will be responsible for passing laws that guarantee meticulous governance and security arrangements for stored data, while healthcare organizations will need to address the increasing cybersecurity challenges. The Royal Free London NHS (National Health Service) Foundation Trust and Google DeepMind, for instance, came under heavy fire in 2017 for improperly sharing private patient information and using it in the Streams app, which was intended to identify, diagnose, and alert users to acute kidney injury. By giving DeepMind the personal information of 1.6 million patients, the Royal Free violated the UK's Data Protection Act.

The Information Commissioner's Office, the independent body established in the UK to protect public interest information rights, encourage transparency by public entities, and protect individual data privacy, based its decision primarily on the fact that the app was still being tested after patient data was transferred and that patients were not given enough notice that their data would be used in the test (Information Commissioner's Office, undated; Hern, 2017).

Another crucial factor in the use of data is privacy concerns. Most often, governments own health data, and they may be enticed to sell it to private businesses. Many times, the users themselves can turn into the "product"—in other words, patient data can be made profitable. The US pharmacy chain Walgreens, for instance, gathers information from prescriptions and sends out mailshots about clinical trials pertaining to the patient's condition.

Companies that recruit patients for clinical trials and pharmaceutical companies pay Walgreens a fee for this service. "[…] Walgreens does not explicitly inform customers at purchase time that their prescription may be used to target patients for medical trials and offer them the ability to opt-out of having their private medical information used in such a manner […]," claims Kalev Leetaru in an

article published in Forbes magazine. (2018, Leetaru). Technology companies that collect patient data may also be able to sell people's private health information to third parties if businesses like Walgreens can do this.

There are additional moral considerations. If the results of AI reveal societal issues, like a possible outbreak of a highly contagious infectious disease, what responsibilities do tech companies have to notify the public? Governments can minimize health risks or neglect to warn citizens when economic interests are at stake, even if tech companies employing AI for health report their findings to them. In 2003, for instance, Chinese leaders delayed reporting the Severe Acute Respiratory Syndrome (SARS) outbreak due to concerns about social and economic stability and the political structure involved in alerting of a disease outbreak (Huang, 2004).

Health-related AI applications

Artificial intelligence applications in the health sector will need robust ethical, legal, and infrastructure frameworks. Government-led projects that aim to create and implement AI applications for health in high-, low-, and middle-income contexts must take these concerns into account. Governments must take business model sustainability into account, as must companies and nonprofits creating AI solutions. In low-resource contexts, this will be difficult because many of the important players won't have the money to buy these tools.

Equity problems are not limited to countries; they also result from the so-called "digital divide," in which different segments of the same society have varying degrees of access to cutting-edge technologies like smartphones and 4G networks. Mobile phone-enabled AI health tools are just one example of how more connected patients and populations will gain access to services like medical information and advice via devices that may not be available to less affluent populations.

A pertinent and helpful case study to put some of these issues in perspective is India. According to Niti Aayog (2018a), the Indian government recently unveiled its AI strategy, with the healthcare industry being a top priority for its implementation in India. India's government wants to establish the country as a "garage" for creating AI solutions for the global community. India faces many of the same issues as many other developing nations, ranging from the nature of diseases to the standard of the health infrastructure.

Challenges and Recommendations

Challenges

Data access is a major problem. In particular, this poses issues for startups. It occasionally creates issues to get consent. The data quality varies. The lack of a formal regulatory area for data anonymization leads to additional issues. India does not have publicly available medical data sets.

Issues arise when there are no standard guidelines for designing AI systems. Privacy and security concerns would be resolved by clear design standards. Additionally, the ethical and trust issues would be resolved. An additional issue is India's lax IP laws. Given the growing use of AI, the IP regime needs to be revitalized. By doing this, the situation would improve.

Other obstacles include a lack of a strong regulatory body, an inadequate certification framework, a lack of strong AI infrastructure, a lack of ethical awareness among stakeholders, a lack of government

investment in AI research and development, and a general lack of stakeholder awareness. Other factors can impede the advancement of AI in India's healthcare system.

Suggestions

The development of human-machine interaction mechanisms should prioritize security and privacy concerns in order to preserve personal health data when formulating policy for India regarding the use of AI in the healthcare sector. In order to prevent legal, ethical, cultural, and social issues from impeding the implementation of the relevant policy, research activities must be developed with an emphasis on these areas.

A focus on involving all stakeholders in the use of AI in the healthcare sector is necessary, and the policy should delicately address all the difficulties that will arise during implementation. The PPP model must be implemented specifically to use AI to manage primary healthcare facilities in rural areas. It is necessary to raise the caliber of training programs regarding AI use in the healthcare industry so that all parties involved are knowledgeable about AI technology. When drafting the policy for AI applications in the Indian healthcare sector, the following points require particular consideration.

- The healthcare industry needs to develop a mechanism for human-machine interaction.

- The safety and security of AI systems must be guaranteed, particularly when it comes to patient health data preservation.

- Research and development efforts in the area of AI application in the healthcare industry need to be enhanced.

- To recognize and address the societal, cultural, legal, and ethical ramifications of AI in the healthcare industry.

- Assessing and quantifying AI technologies in accordance with standards. Additionally, in order to improve AI's application capabilities in India's healthcare sector, the policy statement must include provisions to address the previously mentioned challenges.

- When developing India's AI-integrated healthcare policy, additional considerations must be made in addition to all of the aforementioned.

- A program for experience exchange will be established that will allow all stakeholders in India's healthcare industry to contribute to the use of AI in the various healthcare sectors.

- By promoting the open data system under stringent privacy, security, and interoperability regulations, it will be possible to expand and enhance the application of AI in the healthcare system.

- Providing resources for knowledge sharing among academic institutions throughout India (R&D projects and knowledge exchange program) in order to promote the growth of R&D activities in Indian medical colleges.

- Using AI technology, the PPP model will be implemented to enhance primary healthcare facilities, particularly in rural India.

- Enhancing skill development activities will help doctors become more knowledgeable about AI technology and raise their awareness of ethical considerations that should be incorporated into their practice.

- Creating a specific legal framework to strike a balance between the concerns of privacy and security when using AI to handle health data and the advancements brought about by the integration of AI with the Indian healthcare system.

- Establishing suitable certification criteria and enhancing the AI-powered Indian healthcare system.

These inputs are anticipated to assist the authority in effectively covering all the points when framing AI-integrated healthcare policy in India.

Conclusion: Indian Healthcare and Artificial Intelligence Considerations

AI can surely improve healthcare outcomes in India by increasing efficiency and quality. But the gaps and difficulties in the healthcare industry are a reflection of long-standing problems with low funding, lax regulations, a lack of infrastructure, and deeply ingrained socio-cultural norms. AI solutions by themselves are unable to address these.

It is also not possible to equate technological possibility with adoption. In India, the adoption of AI is anticipated to be gradual and highly diverse due to a number of factors, including inadequate digital infrastructure, a sizable, diverse, and unregulated private sector, and varied capacity among states and medical professionals. The likelihood that reputable private hospitals will be the primary adopters is also high due to the same factors.

The implication is that market forces alone are unlikely to address much of the dominant narrative or rationale for the development of AI in healthcare, with regard to improving equity and quality: these solutions are more likely to benefit populations that already have access to high-quality care, usually in cities with developed digital infrastructure. In many Indian small hospitals and single-provider practices, administrative systems have hardly advanced past basic ICT solutions like platforms for billing and invoicing. Accurate problem identification and matching to suitable solutions are essential to these systems' efficacy.

At the moment, there is a chance that solutions will be driven more by technology than by problems, which means they frequently ignore particular contextual requirements or limitations. For digital products intended for use in remote locations with inadequate basic internet infrastructure, for instance,

it might not be the best strategy to design synchronous or real-time solutions. Because technology developers are usually more tech-savvy than users, there is a digital divide that makes it difficult to design effective digital interventions (Deo and Tyagi, 2019). Lastly, before AI can provide safe and equitable healthcare solutions, concerns about privacy, misuse, and accountability need to be considered more thoroughly.

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