

AI in the healthcare sector: Indian & pandemic perspective

Rajeev Kumar and Pankaj Musyuni of LexOrbis look at AI's potential to strengthen the Indian healthcare system and thus aid it in combatting pandemics.

Artificial intelligence (AI) is considered a significant factor for emerging researches in the healthcare sector, particularly in the pharma and biopharma industry wherein computing technologies are used to analyze the data. There is no mutually agreed definition of AI; however, processes adopting human intelligence for activities such as reasoning, adoption for learning, understanding and interacting are usually considered key factors for defining AI. The healthcare industry is rapidly growing, with a focus on scientific innovations and transforming rationally. While the innovations related to the field of target drug delivery, drug discovery, preclinical and clinical development are increasing with the technical development, AI has the potential to further strengthen the healthcare system. India, being the fastest growing economy with the second largest population, has a significant stake in the AI revolution.

Usually, developing a new drug or method for therapeutic and diagnostic treatment has been a long and expensive process. Similarly, the development of a biological molecule is even more complex, and includes additional steps during drug development and analysis, even after using high-throughput screening methods for particular targets due to complex biological systems.

It can be understood by a simple example, whereby compounds showing in vitro activity may not become the potential drug when tested in vivo due to adverse effects. The healthcare sector, in general, adopted the approaches of AI techniques such as machine learning wherein the data is analyzed and optimized; deep learning utilizes a logic-based approach to match the biological network. Further, natural language processing technique is used to get the coding to recognize and robotics and Internet of Things (IoT) used for the collection of data and information sharing.



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Challenges of using AI in healthcare

The primary concern relates to cybersecurity in the healthcare system, since collecting a large amount of information needs to be protected with privacy. Another issue relates to the availability of resources and their understanding regarding access to data and its interpretation. A potential solution to this is to simplify AI models so that users can input data without complication. A social and institutional understanding of AI is also an important factor for consideration. As building in-house experts will be challenging for companies, it is advisable to build a partnership with an organization providing AI technologies. While healthcare companies will benefit from developing AI solutions, the service providers have the opportunity to learn the data interpretation and increase their capabilities. However, it is important to share information between companies with certain regulations and transparency to understand the process and get an optimum AI-powered solution. The role of regulators to build an acceptable regulatory pathway is also an important consideration to the benefit for all. Similarly, the use of patient data with utmost data privacy is also of prime consideration with sensitivity and legal compliance.

AI can be applied to almost every step in the healthcare industry, from the conception of ideas and manufacturing, clinical trials, to generating market and sales analytics. Using a machine learning program can reduce the time spent on examining data significantly and also cost-effective solutions which allow researchers to focus on other issues to get a positive outcome. AI can be applied and used as a useful tool for strategic market analysis and also in decision making to explore the most profitable avenues. The use of digital technologies has the potential to transform the models for drug discovery, and research timelines and partnership with health

tech start-ups and academia will be helpful to achieve this. It is also important for healthcare companies to be patient-centric and use the information to design better protocols for clinical trials and also ensure quality and safety. In clinical trials, the use of software techniques can be used to reduce the complexity and cost by remote monitoring or using virtual tools.

Applications in healthcare

AI has the potential to provide substantial incremental value economically and its applications can help in addressing primary issues for access to healthcare facilities, particularly wherein the connectivity and supply to healthcare professionals are limited due to transport and other basic facilities. However, this can be fairly achieved by implementing AI-driven diagnostics tools, personalized treatment techniques, early identification of potential pandemics, and the use of imaging diagnostics. Considering some of the examples where AI can be used includes the use of machine learning by using an algorithm or a computer program and performs without having any explicit programming instruction. This technique is commonly used to streamline the clinical and healthcare process. Further, improvement in diagnosis can be adopted wherein the diagnosis and treatment can be managed by using the past history of patients and maintaining electronic medical records for a ready reference. This will also be helpful to get a clear medical history along with a cost-effective treatment and also saves time. These electronic records can also be used in clinical trial research wherein the data is readily available with the required information. In addition, AI could be helpful for an early stage of drug discovery either during a preliminary screening of new compounds, or prediction of success based on a biological factor, machine learning can be used to get the required information and identify new patterns.

Additionally, machine learning technology is currently being used to monitor and forecast an epidemic, based on information accumulated from the web, social platforms, satellites, and other popular sources. COVID-19 (2019-nCoV) disease, which was identified in December 2019 and has been declared a global pandemic by the WHO can be considered, wherein AI is helpful as a powerful tool by using techniques of machine learning (ML), natural language processing (NLP) and computer vision applications to teach computers to use big data-based models for pattern recognition, explanation, and an early prediction. These functions can be useful in early diagnosis, prediction, and treatment of infections, including fast-spreading infections, and helps to manage socio-economic impacts. Since the outbreak of the pandemic, there has

been a scramble to use and explore AI and other data analytic tools, for these purposes.

It has been observed that researchers are increasingly using AI tools such as ML and NLP processing to track and contain coronaviruses which are also helpful in gathering more data to understand the disease. While many countries are tracking individual suspected patients, anonymized data can be collected to study the spread of disease in a more generalized manner. As large amount of data can be collected to gather the relevant information, it is also important to maintain the data privacy to ensure that such data cannot be used for another purpose. The data generated by using AI can be used for knowledge sharing with the utmost transparency.

While this pandemic situation has illustrated several innovative use cases, as well as the urgency to stop the spread of the virus, it is important to not let the consideration of fundamental principles, rights, and respect for the rule of law to be set aside. The positive power and potential of AI is real and helpful in fighting of the spreading of the diseases and eventually saves lives. However, ethical and responsible use of AI must be promised and practiced. It is essential that, even in times of such crisis, we remain conscious of the duality of AI and strive to advance AI for good. An example of using such techniques in India, wherein the Government of India has launched Aarogya Setu, a mobile application aimed to connect health services against 2019-nCoV. The App is helpful in augmenting the initiatives in proactively reaching out to and informing the users regarding the potential risk of infection, best practices and relevant medical advisories

Résumés

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pertaining to the containment of 2019-nCoV pandemic. The App is available in eleven different languages and privacy compliant by its design.

Suggestions

It is possible to make the healthcare system more efficient and automated in various ways such as collaboration with companies specialized in AI-driven medicine discovery to get maximum benefits from expert assistance, advanced tools, and experience. An academia-industry partnership will also be helpful and cost-effective wherein the idea can be tested at a small level. Additionally, developing expertise to adopt AI for new projects can be encouraged. India has an opportunity to leapfrog ahead of the world in healthcare systems by developing unique patient and individual-centric solutions based on AI. The National Digital Health Blueprint circulated by NITI Aayog defines a very compelling roadmap for an innovative and effective healthcare system in India.

Artificial Intelligence has a positive impact on the entire healthcare industry, and this can further be streamlined wherein conducting repetitive tasks consumes major time, such as making data entry, analyzing medical test reports, can be done by using AI to get a swifter outcome. As a result, doctors and additional healthcare providers can have more time to focus on other urgent and complex jobs and interact with patients in a better way and with more personnel attention. Similarly, managing data is another important part that includes the test reports and past medical records. With the use of AI, data management in the healthcare sector has become a hassle-free process. All the data can be collected, stored, reformatted and traced in assistance with digital automation in a fast and consistent way. AI can also analyze each step of healthcare systems appropriately and helps in providing solutions for healthcare providers to make correct decisions for organizing the system in a better manner along with the best patient care. The invoice generation process can be digital. The NLP can be utilized which has the capability of a computer program to comprehend human speech. Accordingly, a massive amount of electronic medical records can be analyzed using this technique to evaluate and handle patients with multiple diseases.

Further AI-based apps designed to give medical consultation based on the details of a patient's illness symptoms and past medical records can be effectively used wherein users can add their symptoms in the app, which eventually suggests the recommended action after analyzing the patient's medical history. These apps are minimizing the overall rate of misdiagnosis and making the consultation

Machine learning technology is currently being used to monitor and forecast an epidemic.

process more digital. Additionally, AI-based apps can also monitor the usage of drugs by a patient in real-time. These apps use a webcam to autonomously make sure whether the patients are taking medicines according to their prescription or not. It helps patients manage their health conditions. Patients with serious health conditions and those who often fail to follow doctor advice can get maximum benefits from such apps.

Conclusion and way forward

The role of AI and big data in treating global pandemics and other healthcare challenges is only set to grow. Therefore, the demand for professionals with AI skills will be increasing. For professionals working in healthcare technologies, getting educated on the applications of AI in healthcare and building the right skill-sets will prove to be crucial.

The world of artificial intelligence is no longer just science-fiction; in fact, we're well into it. Existing legal frameworks are starting to run into issues when it comes to ownership and intellectual property rights regarding complex AI cases. At the present time, a paradigm change is being observed, with engineering principles and product-process design becoming the main principle guiding development and manufacturing in the healthcare sector.

This implies that adopting a pattern of thinking and using AI for diagnosis, prevention and treatment processes are simultaneously and quantitatively being considered.

AI space exists for the implementation of innovative healthcare operations; further work is definitely required, particularly at the interfaces between the manufacturing, research, regulatory compliance and protecting intellectual property and software engineering, in order to make substantial contributions to the successful operation of the healthcare industries. AI systems are becoming more advanced following which the number of "inventions" created by such systems is bound to increase in the future. This offers a wide scope for the framing of suitable legislation in order to provide adequate legal safeguards. More importantly, there is a need to formulate clear and widely accepted guidelines with respect to the application of regulatory and intellectual property laws to AI. The global healthcare sector, particularly pharma and bio pharma industry, is on the cusp of an exciting era, as rapid developments in AI present the opportunity to make more effective drugs and provide faster and cost-effective healthcare services to patients. Developing an appropriate AI strategy is beset with challenges and will require pharma companies to work in new ways and to collaborate more closely than ever before.

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