Artificial Intelligence – An Effective tool in Times of Pandemic Explosions

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Abstract— **In a very short span, Covid-19 has spread all over the world and caused lot of devastation. The pandemic is revamping the style of our healthcare systems. Healthcare organizations need to quickly adapt to the situation using modern technologies. This paper focuses on the use of Artificial intelligence to track, trace and predict the outbreak at greater speeds and also various challenges that need to be overcome for the further advance of the field and to implement the change. Research and medical trails on the development of drugs and vaccines are also conducted quickly and effectively with AI as the algorithm can give results on different trail runs than to do all the manual research. The aim of the article is to review the role of Artificial Intelligence in combating the pandemic at present and also its potential for the future outbreaks. With the support of modern technologies like AI it is possible to reduce the impact of future pandemic explosions or at least we can be more than ready.**

Index Terms— **Covid-19, Artificial Intelligence, Artificial Intelligence in healthcare, Pandemics, Control of pandemic outbreaks**

I. INTRODUCTION

In the light of recent events, amidst the chaos caused by COVID-19 disease the curve of the infected and the deaths in India is increasing day by day. India is combating the deadly virus in its best way possible. But the question is "Is this enough?" Infectious diseases have caused great catastrophe in human history whether it may be plague, Ebola or now Coronavirus. Although we have been able to contain the virus and prevented its reach from community level but the battle is not over yet. The modern technology has immense potential to help the situation. Some of the technological solutions that are adopted or that can be adopted are **Robotics**, **Autonomous Vehicles or Drones** and **Virtual Biometrics**. Robotics may be deployed to take care of patients in isolation, the use of Robots spares healthcare workers the risk of contracting the virus. Autonomous vehicles and Drones are being used to deliver essential goods like medicines and foodstuffs. Drones are being used to patrol public spaces. Virtual Biometrics with facial and iris recognition solutions integrated with infrared thermometers are increasingly being used for screening.

Artificial Intelligence is another such tool which can help the situation. AI can be applied in various types of healthcare. AI applications can be mainly used in forecasting a likely outcome of a situation and can be used tracing and tracking contacts during epidemics. AI can be used to track and predict how the disease will spread over time. For instance, at the time of Zika virus an AI model was developed to predict it's spread. Models like these however need to be retrained and altered according to the new data from COVID-19. AI applications are expanding into areas that were previously thought to be only the province of human experts. Using AI, researchers from all over the world are collaborating to create a prediction model for antiviral drugs that have a chance at battling Coronavirus. There is a great potential for AI being used as an infection path predictor, predicting how COVID-19 or any other outbreak is likely to spread. With infectious disease like these, surveillance is crucial in this interconnected world. AI offers a chance to respond quickly and effectively to the threat of pandemics, because of its capability to work faster than to do all the manual research. AI can help predict if potential drugs will prevent virus binding with human cells, if the drug is likely to be toxic to human cells, and if it could cause dangerous interaction with other common drugs, thereby helping to analyze potential drugs before lab testing.

The initial stage of outbreak analytics is detection. Quick detection is crucial because it enables early intervention, early detection and early response is the best possible defense against the contagious diseases and AI's accountability must be trusted to accomplish the task. Building trust is an important element to receive data from the people. AI can use sophisticated algorithms to learn features from a large volume of healthcare data and then use the obtained insights to assist medical practices. AI's algorithm mainly uses the personal data and citizens have to be trusted with this. Citizen's willingness to provide data in these tough times can be achieved only if they trust it completely. The types personal data being used and for what purpose must be communicated to the citizens and assurance should be given that the use of their data is for limited duration of the crisis. This level of transparency can help to build trust among the citizens.

II. CHALLENGES FOR THE DEVELOPMENT OF AI IN INDIA

Some challenges that the progress of AI in India faces is limited availability of manpower and of good quality and clean data. **Data availability** mainly in the medical field has many obstacles. Training AI systems requires large amount of data from sources such as health records, pharmacy records, insurance claim records and many more. But health data are often problematic, patients typically consult different doctors, change insurance companies, purchase medicines off record, many such parameters leads to data split in multiple systems

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and multiple format. These fragmentations lead to risk of error and decrease the data reliability.

Privacy is also a major issue faced by data scientists while collecting data. Although government ensures data privacy, people still have concerns and are reluctant to share data. Concerns regarding data privacy to the point that they are even hesitant to share medical results knowing that it could provide some personalized knowledge about their health, so data protection still remain hazy domain hindering the growth of AI. **Transparency** in the process is also major challenge as a doctor needs to be able to understand and explain why a certain procedure was recommended by an algorithm. This becomes necessary for the development of the more intuitive and transparent prediction-explanation tools. There are risks involving bias in healthcare AI. AI systems learn from the data on which they are trained, and they can incorporate biases from those data. Human intelligence is always required to guide the process as each patient possesses variety of symptoms for the same disease.

Trust among people to adaptation of new technology is also a great challenge. People are reluctant to accept changes in the medical field because they don't trust it completely. They prefer a human surgeon to perform a surgery than a robot doing the same, creating awareness and making people to trust new technologies need time. The greatest challenge to AI in healthcare is ensuring their adoption in daily clinical practice. For widespread adoption to take place AI systems must be approved by regulators and standardized to a sufficient degree. These challenges will be ultimately overcome, but will take longer for the technologies themselves to mature.

III. INDIA'S EFFORTS

As Covid-19 pandemic is spread across the globe, researchers and entrepreneurs stepped up to devise new ways to combat it. From understanding and preventing the spread of the virus to diagnosing and treating it, startups and established technology companies in India are actively leveraging AI to support this fight. Decision makers have increasingly relied on computer simulations to understand how the pandemic situation will evolve over time. TCS, in collaboration with Pune-based Prayas Health Group, is using digital twins to forecast the spread of COVID-19 in urban districts. A digital twin is a virtual computerized model of a physical system that takes real-world data as input and predicts the future evolution of the system. Ensuring people wear face masks and follow social distancing is expected to be a major challenge for organizations. AI is being used to monitor live CCTV feeds and instantly report violations of guidelines to safety administrators.

The AI-based computer vision solution developed by another T-Hub incubated startup is called Safe-vision which can be integrated into existing CCTV or drone cameras to monitor crowds in public places including shopping malls, stations, hospitals and more. This AI-based product analyses the video footage in real-time and alerts safety officers in case of safety violations. It also monitors people for wearing personal protective equipment (PPE) and maintaining social distance through computer vision and image analysis. Another startup named Cognicare designed first portable IR thermal sensor infused with AI algorithms. Apart from predicting the patient, the AI-based solution also monitors recurrence of the virus once the patients are cured. One more Mumbai based startup uses deep learning tech to undergo X-Ray screening which can detect symptoms, further trained their algorithms to go a step further to predict a Covid risk score which tells the likelihood of a patient having Covid-19 from these X-rays. These algorithms are equipped to run on cloud hardware and are currently being deployed in more than 40 sites across 7 countries.

Vehant Technologies an IIT Delhi startup has developed an AI-based automated temperature monitoring system. Combining visual and thermal camera, this dual system can be applied to an array of premises. The AI-based intelligent analytics solution can be used for face mask detection and monitoring social distancing while ensuring non-contact detection and providing real-time alerts. Staqu a Gurgaon based startup is using AI based thermal cameras. The camera called JARVIS helps in creating a real-time alert in case it detects a person with increased body temperature. The camera has a range of up to 100 meters and can monitor multiple people at the same time. It is highly effective and functional in crowded places like airports, railway stations, malls, etc.

IV. FUTURE POTENTIAL

Making the most of the AI will take a lot of data, time and smart co-ordination among many different people. As AI is becoming a mainstream, healthcare is certainly an area where it will play a vital role in keeping us safer and healthier today as well as in future.

After the present situation is under control it is not too early to ask 'What happens next?' preparedness for the pandemic is what we lacked and from past experiences we need to be ready for the future challenges. We should be doing everything we can to make sure we are prepared for the next outbreaks. Researches must be encouraged related to the production of effective vaccine so that we can be more than ready for future. It is also important to have a functional public health department for essential disease control efforts.

Hard lessons will have to be learned from this pandemic so we do not repeat the same next time around. The role of technologies like AI and Big data in treating pandemics and other healthcare challenges is all set to grow, it is essential that researches in such areas must get encouragement and various platforms must be developed where they can be implemented and tested. Healthcare organizations are in urgent need for decision making technologies to handle the situation, it may also play a vital role in understanding and suggesting the development of a vaccine for infectious disease of this kind. This result-driven technology is used for proper screening, analyzing, prediction and tracking of current patients and likely future patients. It is important to develop an early warning system that closely tracks global disease trends and distributes accurate real time information about them.

AI can help governments prepare their readiness for the next pandemic with computer modeling and simulations in the same way AI helps them to prepare for war through military

simulations. Although technology cannot stop the spread of the epidemic but it can educate, warn and empower those on ground and those that need to be aware of the situation to significantly reduce the impact.

V. CONCLUSION

Combining human intelligence with the power of machine learning will no doubt prove in fight against pandemics like the one we are experiencing. The use of AI even with acceptable margin of error must be implemented. With AI we can free up a lot of humans from interacting with each other increasing the potential to save a lot more people. Investment in preparing data today will be a key to fight bigger threats of tomorrow. Government should recognize the role played by AI and should implement while preparing for managing global pandemics. AI could also become hugely important in detecting outbreaks before they have chance to spread. It will take lot of hard work, research and ingenuity to stop the spread of Corona virus, but this advancement in technology and ability to quickly, reliably share information across the world can help lead to further discoveries and save countless lives.

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