AI and Big Data in Healthcare: Impacts and Challenges in Covid-19 Outbreak Prediction and Management

Abdul Sajid Mohammed, PhD*

*University of the Cumberlands, School of Computer and Information Sciences,

Williamsburg, Kentucky, USA.

Email: amohammed5836@ucumberlands.edu ; sajidasm@outlook.com

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Abstract

A disease outbreak is challenging to predict. However, with the recent Covid-19 case, many governments are trying to develop a model and use data to predict its effects. As a result, AI is most widespread inthe healthcare field, particularly with the spread of Coronavirus. Indeed, technology influences healthcare across many sectors by automating procedures, improving operations, and altering traditional approaches. Artificial intelligence in health care is essential in manufacturing drugs, offering significant discoveries by analyzing big data and making clear decisions with fewer errors. This article will provide an overview of the sound impacts of using AI and big data to tackle several pandemic challenges and investigate how AI impacts the health sciences business. Since the Covid-19 virus spread throughout the country, many countries, including China and US, have deployed big data, AI, and other automated tools to monitor and contain the outbreak. The article provided an in-depth analysis of the use of big data and AI to draw patterns of disease outbreaks.

Keywords: *Artificial Intelligence, Big Data, Healthcare, Pandemic, Predictive modeling, Drug manufacturing, Error reduction, Disease outbreak patterns*

1 Introduction

The pandemic changed the healthcare sector dynamically, where technology has not penetrated significantly. It led to the full-force deployment of technology such as big data and Ai to manage the situation. Cutting-edge medical tech- nology, such as artificial intelligence (AI), has been used to comprehend better and explore the human body's hidden world, leading to the discovery of cures for illnesses that had previously been thought to be a death sentence for mil- lions of people [1, 2]. [3] research explored ways to advance the capabilities of quantum computing, digital medicine, and information technology to improve human health through the Rockefeller Foundation Collaboration, including the use of cutting-edge epidemic technology to address pandemic risks and enable effective outbreak forecasting, early warning, and

precise intervention. Scientists are relying on AI in their urgent search for a therapy that will elim- inate the new Coronavirus and help alleviate the worldwide health threat [4]. According to Chowdhury et al. [5], comprehensive screening and quick med- ical attention for affected individuals are critical to controlling the spread of COVID-19. Fong [6] stated that although few people considered the importanceof big data in the fight against health crises a few years ago, the continuous spread of the virus has prompted the world to incorporate big data to man-age the covid-19 virus. Lin [7] agreed that many nations, like South Koreaand Mainland China, use artificial intelligence to ensure communication com- pliance. According to [8], the use of AI and big data has enabled the capacityof the world to generate, collect, and evaluate data to become more appar- ent as a response strategy to the covid-19 pandemic. [9] argued that artificial intelligence assists in discovering remedies to the virus and establishing ther- apy possibilities for testing patients because of its capacity to spot patterns in data and make predictions. From the literature, it is clear that technology will continue to play a critical role in managing new diseases and even predicting the future of healthcare.

1.1 Problem Statement

Over the last two years, studies have been conducted on technology and its impact on healthcare; however, gaps exist, especially on the effects of AI and big data on fighting the covid-19 [10]. Therefore, this article provides an in-depth analysis of AI and effective data use in healthcare. As the emotional effect of a pandemic on the globe, parts of endeavors have been paid for answers in the battle against the pandemic events [11]. Countries' efforts can stop the pandemic, e.g., the secession of some regions to restrict the spread of disease that guarantees medical care approaches [12]. The emergence of the covid-19 worldwide pandemic offered several obstacles to healthcare institutions, particularly healthcare practitioners. Data creation in healthcare institutions has grown at a pace that is much above average since the start of the covid-19 [13]. According to IDC, healthcare is predicted to develop faster than any other industry in terms of data creation until 2025. While healthcare businesses may enjoy these same operational advantages, innovations such as cloud storage, AI, data visualization, and data mining can also assist healthcare facilities, and health providers boost treatment, thus, saving lives [14]. Big data may help hospitals shift from a reactive treatment strategy to a highly integrated, preventative paradigm [13]. Data utilization helps hasten the creation of customized methods for improved patient involvement, which might lead to higher compliance. Data may provide insight into the factors that influence the health of diverse populations. A careful study of the data allows health providers to discover and apply optimal practices backed by credible research. Proper healthcare data use may neutralize inherent or deliberate biases in gender, race, or culture.

The following questions will be the focus of this research.

1) Were big data and AI helpful in the battle against pandemics?
2) Is there a correlation between big data and AI to Covid-19?
3) What is the future of healthcare regarding technology?

1.2 Significance of the Study

As mentioned, there still exist gaps in using big data and AI in healthcare sectors. Thus, the significance of this study is to provide an in-depth analysisof various literature on how technology help to manage the pandemic. Many papers and preprints have been distributed online over the past couple of months to understand better and manage the pandemic. The fundamental objective is to show the adequacy of AI and big data in the battle againstthe COVID-19 pandemic and survey cutting-edge approaches utilizing these technologies [15, 16]. Additionally, we feature difficulties and issues relatedto existing AI and effective data-based methods, which propel us to create a bunch of proposals for the examination models that help navigate the dynamichealthcare system. Thus, it will increase knowledge of using big data and AIin the healthcare industry. Medical services information - which incorporates static information from patient records, analytics, and reports, and dynamic information from bedside screens or distant patient checking - is generally unstructured [17]. It goes past the capacity of customary logical devices to deal with such complicated and emotional information [18]. With enormous information examination and computerized reasoning, this information can be handled to get significant experiences that would assume a fundamental part in saving patients' lives. Then again, this innovation likewise has the potential to further develop the populace's health services by dissecting infection examples and following sickness flare-ups.

2 Literature Review

This section provides background covering traditional feature extraction techniques, adult and children speech datasets, and evaluation metrics that are essential aspects of speech processing research.

2.1 Background Study of AI and Big Data

AI is at the intersection of many fields of mathematics (optimization, logic, analysis, linear and algebra probability) and computer science [19]. Cogni-tive science must combine these essential scientific disciplines with a technical understanding of the sectors to which they are applied. Patients may now

make predicted diagnoses, virtual follow-up consultations, and digital records as artificial intelligence technologies increase and evolve. Artificial intelligence has numerous current and innovative technologies that can forecast and detect illnesses at first and deal with vast volumes of data and diagnosis [9, 20]. It may even obtain the highest efficacies in medical sectors for situations. The contemporary era's technology sector is founded on many significant pillars, including artificial intelligence, which is regarded as one of the fields of computer sci- ence. Innovative AI attempts to develop systems that experience intelligence and act as people do about learning and comprehending. These technologies may give their users a range of instructional and directing services. Such capa- bilities include the ability to ponder or learn from past encounters or other mental processes. [21] argues that AI is a machine's ability to execute the actions that demand human cognition in their implementation. For instance, the goals of developing, exploring, and evaluating hypotheses on how the mind functions include logic reasoning, learning, and reasoning. In the field of com- puter science, AI deals with creating intelligent machines capable of doing activities that would typically need the use of human cognition. And they have become a technology industry philosophy. Learning to program with AI neces- sitates the skillset it takes to develop as a human being in terms of knowledge, problem-solving, creation, and planning [22]. According to [23], AI may be usedin several fields, including education, robot control, medical diagnosis, major video games, stock trading, scientific discovery, and stock trading. Big data isa term for enormous and complex arrangements of information in which con- ventional techniques for handling information are inadequate. The expanded information has achieved big data with a Vs. Model, i.e., the increment of Volume, Velocity, and Variety. Gartner and numerous endeavors, including Microsoft, utilized the "3Vs" model to depict ample information. During the "3Vs" model figure 1, volume implies an assortment of enormous information scales that are progressively tremendous [24]. Speed alludes to the practical- ity of big data; explicitly, information assortment and handling examination should be quick and suitable to acquire the most extreme worth. Assortment implies many sorts of information, counting organized and unstructured data like sound, video, text, and conventional organized information (CRM, ERP, SCM). Both amorphous and organized information can break down using Hadoop.

The big data 3Vs provided a clear understanding of the utilization of data to understand the healthcare situation, which played a critical role in the covid-19 period. The volume property is evident in its definition; big data is about volume. It is estimated that over two quintillions of data are created every day. It helped to predict the covid-19 situation. At the same time, velocity helped to measure the speed at which covid-19 data was created. The variety played critical role help to create and shape the future of data presentation, especially in the healthcare sector. AI is making PC frameworks equipped for executing human cerebrum assignments in many fields in all parts of day-to-day

existence. The upgrade in data and correspondence innovation (ICT) has undeniably worked on the nature of individuals' lives all over the planet [25, 26]. Mainly, ICT has prompted an extremely poor and massive improvement in the health area, which is regularly known as electronic health (eHealth) and clinical health (mHealth). Profound AI and AI approaches are generally introduced in numerous applications utilizing colossal information, which comprises all critical information about the clinical well-being and illnesses a model can access at the hour of execution or determination of sicknesses [27, 27]. For instance, cardiovascular imaging now has precise imaging joined with massive information from the eHealth record and pathology to more readily describe the infection and customized treatment. In clinical work and imaging, malignant growth care is further developed by knowing the cancer science and assisting in the execution of accuracy with medicining [28, 29]. The Markov model is utilized to remove new methodologies for using disease. In this paper, we have surveyed existing examinations applicable to eHealth and mHealth, where different models are discussed, which involves ample information for the finding and medical services framework. This paper summarizes the new encouraging utilization of AI and enormous information in clinical well-being and electronic well-being, possibly enhancing conclusion and patient consideration. Additionally, Man-made intelligence is a field of software engineering which is fit for replicating human qualities, limits of learning, and information capacity. It executes human cerebrum errands in the vast majority of the fields in all parts of our routine utilizing large information applications. Super PCs are breaking down enormous amounts of information using the calculations of cutting-edge profound learning machines, which has permitted the improvement of results in the field. This field has driven exceptionally destitute and gigantic upgrades in each area of life, particularly in medical services. Enormous information examination is placed in biomedical sciences; the preeminent wellspring of considerable information has been talked about and made sense of, particularly in oncology, cardiovascular illness, hypersensitive sicknesses, clinical work, ear sicknesses, etc. [27]. It also contacts a part of the need to consolidate a few neurotic and clinical sources, personal satisfaction information, and unique quantitative neuroscience datasets. Clinical consideration and treatment are getting upgraded step by step. Analysts gather information to make human considerations and find sickness productively and functionally. Clinical specialists have misgivings about the assistance that artificial consciousness with canning conveys to them in their clinical practices. Studies have investigated a justifiable encounter that incorporates all difficulties, dangers, and solace since the execution of AI customized with the assistance of enormous information in medical services inside an infectious illness setting [30]. The program aimed to plan various instruments to uphold a precise, objective, practical, and dynamic clinical cycle. In biomedicine, there are numerous ways of gathering information from perception and trials. Researchers frequently battle to collect information about the illness and how information is being created to treat sickness. This biomedical data is to think, make due, and dissect how they

can change into additional logical discernment for improving patient consideration. It is a significant test for the National Institutes of Healthcare (NIH) to lead the enormous information to information portrayal [31]. The offices are attempting to gather information progressively with expanding research efficiency. Driving focuses are created to deal with this kind of case with an enormous scope of knowledge. They will investigate how much exact gear is expected for the new age of biomedical information researchers.

2.2 Current application of big data and AI

Big data and AI are two words that are broadly utilized while examining the future of business. The possibility of applying them in different parts of the company has gotten the creative mind of many, specifically, how AI could supplant people in the working environment. Extensive information and AI could alter business cycles and choices more qualified to individual necessities and assumptions, working on the effectiveness of processes and options. While many advantages can be anticipated from huge information and AI, various dangers require some contemplation [32]. General direction or guidelines connected with the utilization of enormous amounts of information and application of AI could ultimately be created by state-run administrations,and the protection area ought to be ready to consolidate them in their partic- ular setting. Enormous information in various datasets can be anything from extended datasets to web-based entertainment information. The granularity of information can give bits of knowledge about different anticipated ways of behaving and occurrences. Since protection depends on foreseeing how chance is understood, approaching ample information can change the protection creation process. In any case, the granularity of information can likewise prompt the assistance of hazard arrangement, where protection premium is set in light of a comparative gathering of risk profiles. The more definite agreements of information grant the adjusting of chance grouping, which could prompt a decline of expenses for specific buyers from one perspective and avoidance of protection contributions for different purchasers [33]. Because of AI, AI can learn and adjust such that ordinary machines are not ready to and can improve their presentation with additional information. It may be embraced for various cycles and dynamics in protection production. Extensive information examination and computerized reasoning AI advances have drawn expanding interest from scholastics and experts [34]. In any case, scarcely any observational studies have explored the advantages of AI in the production network coordination process and its influence on natural execution. The following figure illustrates the utilization of the big data model.

2.2.1 Healthcare, Big data, and AI

In the face of this pandemic, many scientists believe that artificial intelligence is humankind's only chance. Innovative technology and big data applications have helped many nations combat that infection and tackle it accurately,

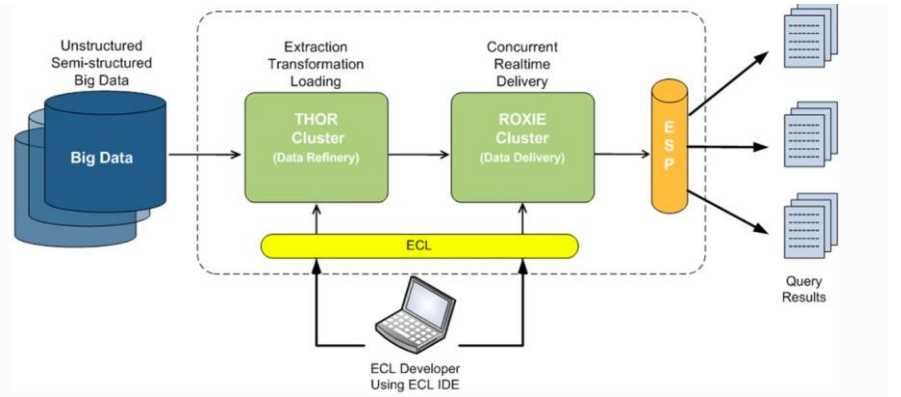


Fig. 1: Flow Chart of High Performance Computing Cluster System in Big DataDomain [35]

depending on AI systems. Health facilities can use fifth-generation infrastructure like robots, drones, 3D printers, the Internet of Things, and other connected devices to diagnose disease and stop its spread. Healthcare facilities can also use these devices to sterilize cities and regions and provide medical advice and guidance if the instructions are not followed. Unconventional states that nations may rely on to fight the virus [36]. Since each country has its method of coping with pandemics and potential future outbreaks, humans can learn from each other's efforts. The Chinese government also launched the Close Contact Detector app that alerted customers if they had a disease in connection with someone else. Transport validity documents generated by network operators could list all cities accessed by consumers over the last two weeks to determine if a lockdown was suggested based on their position. By integrating the data obtained by China's surveillance network, the nation could identify measures to fight the spread of the Coronavirus [37]. By learn- ing from each other, nations can gain insight into using artificial intelligenceand big data within their borders to combat future epidemics. Therefore, the country should employ AI applications as shown in the following figure, which illustrates how machine learning has helped improve health feedback. Additionally, as for the diagnosis: The use of Artificial intelligence is the hub that provides thermal cameras with bright screens that measure the temperatures of covid-19 patients in the streets, squares, and stations and send the signal to the personnel responsible for monitoring patients' high temperatures or showing signs of the covid-19 virus. The monitoring personnel can then eliminate the suspected patients showing signs of the virus and bar them from using the bus or train until the relevant stakeholders that handle the situation take them to the quarantine facilities. Counting affected and recovered patients and monitoring the virus's transmission: According to [38], monitor- ing sickness and prompt activation of AI and CT scans can minimize disease transmission. Mathematics models based on artificial intelligence and process

research can track the growth in virus-infected individuals based on equations and assumptions related to variables such as the virus's nature and its effect on high temperatures, population density, relative humidity differences, and different ways of life and differences in physical immunity [39]. Importantly, AI anticipates the Coronavirus in light of these factors, prepares for it, and proposes what should be done in light of this the next time.

Employment in countries with workplace closures
(As of the 22d of April 2020. Refers to countries implementing required or recommended workplace closures)

	Employed in countries with workplace closures (in millions)	Share of employed in countries with workplace closures (%)	Employers in countries with workplace closures (in millions)	Share of employers in countries with workplace closures (%)	Own-account workers in countries with workplace closures (in millions)	Share of own-account workers in countries with workplace closures (%)
World	2 259	68	71	82	740	66
Low income countries	75	25	2	31	40	27
Lower-middle income countries	1 119	98	32	100	540	97
Upper-middle income countries	502	39	19	62	115	31
High income countries	563	96	19	96	44	94
Africa	265	56	11	77	117	51
Americas	460	98	17	98	87	95
Arab States	49	89	1	76	4	69
Asia and the Pacific	1 092	57	29	71	486	65
Europe and Central Asia	393	95	13	96	45	94
World without China	2 259	88	71	93	740	84

Source: ILOSTAT, ILO modelled estimates, November 2019 and The Oxford COVID-19 Government Response Tracker.

Fig. 2: Employment rate in the countries with medical workplace closures

2.2.2 Covid-19 and AI

With the sensational effect of COVID-19 on the globe, parcels of endeavors have been paid for answers for the battle against the COVID-19 flare-up. The government's efforts are, for the most part, dependable on stopping the pandemic, e.g., securing the (fractional) region to restrict the spread of contamination, guaranteeing that the medical services framework can adapt to the flare-up, and giving the emergency bundle to lighten influences on the public financial aspects and individuals and embrace versatile approaches as per the COVID19 circumstance. Simultaneously, people are supported to remain solid and safeguard others by following a few pieces of advice like wearing the veil in public areas, washing their hands now and again, keeping up with the social separating strategy, what's more detailing the most recent side effects data to the provincial health center. Then again, innovative work pertinentto COVID-19 is focused on and has gotten exceptional interest from different partners like state-run administrations, businesses, and the scholarly world.For instance, it concentrates on showing the colossal effects of the COVID-19 pandemic on the worldwide store network and considers various parts of supplychains, including feasibility, steadiness, strength, and strength. Other than the global endeavor to create an adequate immunization and clinical treatment for

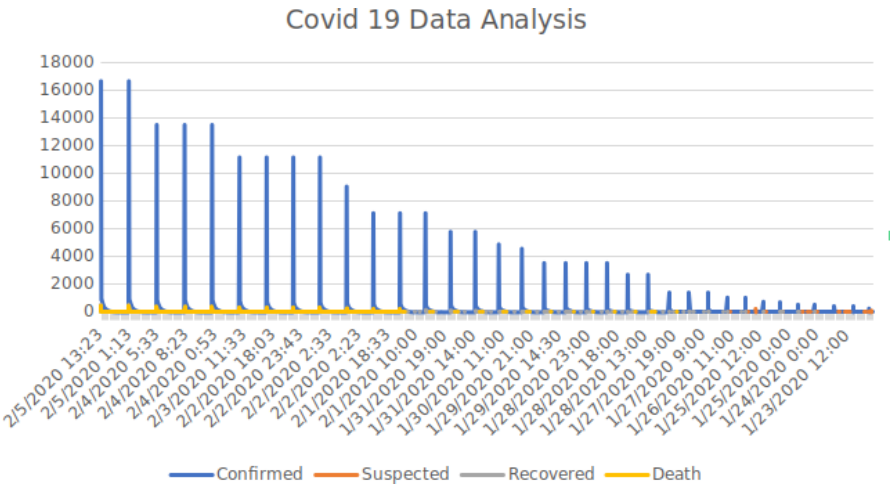


Fig. 3: Covid-19 Data analysis

COVID-19 Covid, software engineering specialists put forth initial attempts for the battle against COVID-19 propelled by the enormous outcome of AI and big data in different regions. This section presents state-of-the-craftsmanship solutions and approaches given AI and big data for handling COVID-19 [40]. It will be divided into three sections: an explanation of AI and big data, its application, and its impact on the healthcare sector. Generally, clinical specialists depended on the restricted measure of data accessible to them and their previous encounters with patient treatment. Accessibility of information from various sources today offers the chance to have a comprehensive comprehension of patient well-being. Utilizing trend-setting innovations over this information additionally empowers admittance to the correct data at the ideal opportunity and perfect spot to convey the proper consideration. It is highly significant in medical services, where a solitary choice can contrast life and passing.

AI is utilized to monitor the spread of Covid-19: Covid-19 outbreaks in Wuhan, China, which have been flagged by the Blue Dot network, which uses AI to track the global transmission of infectious diseases. Machines may learn to identify infections by adding more information to their databases, according to [41]. They predict how and when an infected population will migrate by tracking the virus's progress. Diagnosis of Covid-19 by use of AI: Using thermal and computer-based cameras, Baidu's AI technology pre- dicted patients' body temperatures in public places. As the system alerts everyone with a temperature over 37.3, it can check up to 200 individuals per minute and determine their temperature to within 0.5 °C [42]. [43] claims that in the year 2020, an artificial intelligence system will be able to feel the heatin bicycles and identify viruses in computed tomography of the chest without compromising human life. Reliance on robots for patient handling and sterilizing: Reducing contact between infected patients and those who have not been

exposed to the virus is one of the critical approaches to stopping the spread of the Coronavirus. Several businesses and organizations worked to automate various processes that called for patient interaction from healthcare professionals. Chinese companies used robots and drones to carry goods without physical touch and spray disinfectants in public spaces to lower the danger of infection. Various robots People look for COVID-19 signs such as high temperatures and other symptoms. [44] claimed that facilities must periodically sterilize robots to prevent them from spreading disease. Still, they may pro- vide patients in hospitals with food and medication and clean their rooms without the assistance of nursing staff. Cleaning procedures for cooking robots are different since they may be washed after usage. Furthermore, the use of

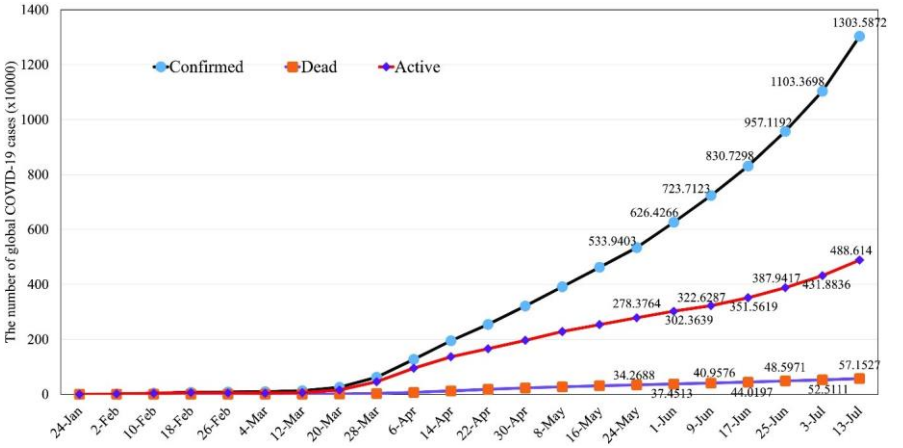


Fig. 4: Covid-19 data trend

surveillance cameras to instruct AI systems: Closed-circuit cameras have been used to train artificial intelligence to recognize covid-19 signs in individuals in airports, shopping malls, streets, and other public locations. Computerized aided tomography: One of the primary tools for doctors to properly recognize and manage the condition is computed tomography of the lungs. Coronavirus infection may be identified using these images. Since January, many artificial intelligence firms have trained their computers to detect CT images [45]. Initially, they served as "another pair of eyes," assisting physicians who were wary of carrying large packages. AI could recognize COVID-19 in the lungs in seconds at the end of February. The Chinese e-commerce titan Ali Baba has also created an AI-based diagnostic system. According to industry experts, the device can identify the Coronavirus with 96 percent accuracy in 20 seconds. Chinese hospitals have already implemented this technique in hundreds of their healthcare facilities. Using AI, countries could quantify the number of incidences of covid-19. The figure below illustrates its applicability [46].

AI aids in the search for a Covid-19 treatment that helps develop an effective vaccine; scientists must first understand the structure and biology of the developing Coronavirus. The Google Deep Mind department investigated proteins that may be connected to COVID-19 using the most recent AI techniques [47]. The corporation made its research available to the public. Deep Mind claims that its computer predictions of protein structures have not been validated in humans. Still, they expect that they will aid the scientific community in understanding how this coronavirus functions. Human artificial intelligence systems apply therapies for the most severe ailments in Benevolent AI. They changed their system a few weeks following the new Coronavirus epidemic to choose current drugs that may assist them in curing the virus. AI can remotely detect body temperature and pulse rate: A fever is a symptom that the Coronavirus is advancing. The blood pressure of several patients was also reported to be high. Pressure may be estimated using artificial intelligence advances by utilizing the smartphone camera to record an image of one being held against a wall. Fitness trackers and smartwatches may also provide heart rate data. According to recent research, measuring heart rate changes and abnormali- ties may aid in the early detection of respiratory disorders. Create software to

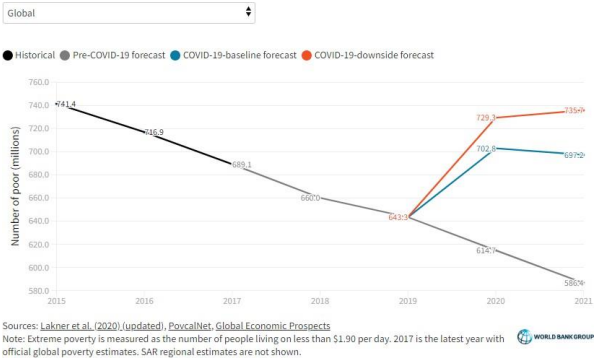


Fig. 5: Covid-19 data trend [48]

gather patient information: Johns Hopkins University has created a tool that collects real-time data on Coronavirus infections throughout the globe [49, 50]. Artificial intelligence can generate mathematical models that characterize illness development, peaks, and declines. A similar strategy was employed in Italy during the Coruna virus epidemic. Chabot's responses to Corona Virus questions: Bespoke's conversation robot was constructed after a severe earthquake rocked Japan in 2011. Today's show includes the most recent information on the Coronavirus epidemic, illness data from across the globe, information about prevention and symptoms, and the most recent advancements in the sector of transportation services. According to [51], diagnoses might lead to better treatment for hospitalized patients. An artificial intelligence startup, "Infravision," employed X-ray analysis to help clinicians detect and track the transmission of

the Coronavirus, mainly because the disease's rapid expansion put a strain on radiography departments. Additionally, scientists at the Massachusetts Insti-

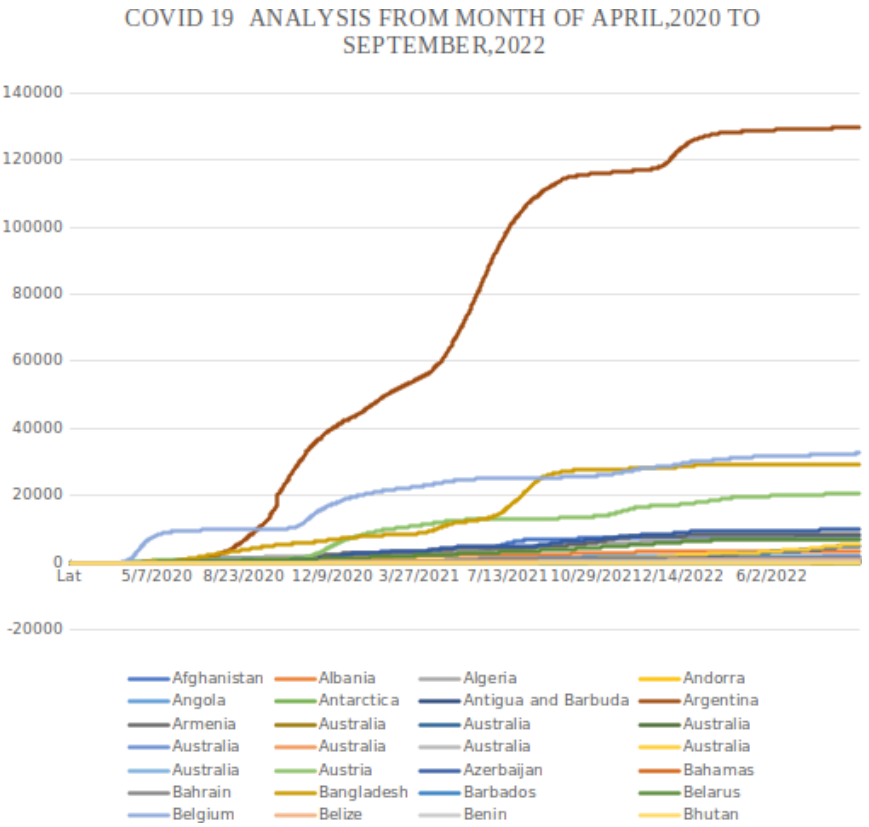


Fig. 6: Covid-19 analysis from month of April, 2020 to September, 2022

tute of Technology in the US have developed an AI that may identify instances of breast cancer four years earlier than they emerge on traditional x-rays in the body. In addition, this AI could identify breast abnormalities that cannot be discovered or evaluated using standard methods. While reducing physician workloads, this technology can give more precise diagnoses and free time for hands-on patient care [52]. AI will play an active role in health sciences, even though we cannot predict all future effects. I include helping patients get better diagnoses and deriving valid conclusions from massive data. According to [53], deep learning is a solid and fantastic approach since artificial intelligence can identify illnesses better than physicians. In medicine, artificial intelligence is used to evaluate primary data and construct filters that aid in forecasting and diagnosing patients. As a result, when a patient enters a hospital, artificial intelligence assists clinicians in diagnosing and treating the patient.

2.2.3 Impact of Big Data and AI in on Healthcare

Artificial intelligence enables computers to learn and conduct cognitive and logical tasks. Scientists, medics, engineers, and mathematicians help to enter data and construct an automated research method. Massive data in treatment and medical diagnosis combine linguistic and cultural knowledge to produce dependable and safe healthcare delivery systems [54]. One of the goals of medical research is to reduce mortality rates by preventing sickness, developing effective and accurate therapies, using prior experiences, and evaluating their results. Artificial intelligence will help prioritize urgent circumstances and recommend targeted remedies to reduce mortality. Quick and precise diagnosis: Current AI systems assist and counsel those seeking medical attention and may get treatment at home. In 2016, the IBM Watson computer was used. A product is IBM Watson (a computer AI system capable of answering questions in natural language). A young Japanese kid with leukemia was the subject of the puzzling case ”Diagnosis within minutes” (leukemia). A comparative study using 20 million tumor data was conducted to do this. Therapeutic robots: Caring for others improves our health by lowering blood pressure, reducing stress and anxiety, and increasing social cohesiveness. It is possible to enhancethe lives of the elderly by using therapeutic bots in the form of people andby using the robotic technique [55]. Reducing human mistakes due to tired- ness and physical exhaustion: Human mistakes are costly and more likely to occur if the person making them is fatigued. Even though AI is still in itsinfancy, one advantage it has over humans is that it is not affected by human traits like fatigue, dispersion, or mood swings. And it’s a lot faster and more accurate than humans in processing large volumes of data. According to [56], AI and big data may help reduce the number of physicians and nurses, which raises the demand for AI and big data. Lowering medical costs: AI is costlyto research and build, but it can do very complex tasks once done. AI can discover problems that could go unnoticed, resulting in early medical inter- vention. The process of creating new medicines and vaccines is a lengthy one, and it requires many resources. More than a million test results and data may be analyzed using AI. Evolution in radiography (x-rays): Cardiac MRI, body magnetic resonance imaging, and prenatal image analysis have all become pop- ular. Ongoing research for innovative diagnostic procedures and algorithms, as well as a critique of examination data after the diagnosis, is ongoing. Virtual presence: With the help of a robot, doctors may treat patients and medical staff without having them physically in the room. As if they were in a real hos- pital, they could wander about and interact with each other similarly. Patients unable to go to a doctor’s office may now be aided by experts who can uti-lize video conferencing technology to communicate with their patients. The minimum risk of deep surgery: Google and Ethicon teamed together in 2015 to create surgical instruments powered by artificial intelligence [57]. Robotics, augmented reality, improved imagery, and sensors benefit from Google’s soft- ware and data processing strength. Less surgical depth is required, and thereis less stress, less blood loss, and less trauma due to the robotic. Over the last

14 2.3 Challenges facing the use of AI and Big Data

decade, big data has seemingly appeared out of nowhere, quickly transforming into a multibillion-dollar industry. With the massive volume of data generated, processed, stored, and analyzed by Internet-connected devices, companies ben- efit from big data and its ability to help leaders operate more effectively and productively. A pandemic can only be effectively managed by using physical space, temperature detection, monitoring of human populations, and the distribution of antibacterial agents, as well as the administration of medications and tracking of the disease's progress [57]. Several sectors have discovered the competitive benefit of employing big data and have experienced production improvements of 5 to 20 percent by embracing big data, enhancing the relevance of data analysis in enterprises looking to keep an extra edge over their rivals. According to [57] rising professions report for 2020, data scientists will be the most in-demand profession in the next few years, a field that was previously almost non-existent. Growth in the big data business has resulted in many factors, including the rise in the Internet of Things. Using phone data assists businesses in collecting consumer information by allowing marketers to gather data about scientists and their goods, as well as the expanding usage and development of artificial intelligence and cloud computing.

2.3 Challenges facing the use of AI and Big Data

Unlike doctors, technologists are not committed by regulation to being responsible for their activities; all things considered, moral standards of training are applied in this area. This correlation sums up the disagreement regarding whether technologists should be regarded as responsible because AIS is utilized in medical services and straightforwardly influences patients. On the off chance that a clinician can't represent the result of the AIS they are using, they will not have the option to suitably legitimize their activities on the off chance that they decide to utilize that information. This absence of responsibility raises worries about the possible security results of using unconfirmed or unvalidated AIs in clinical settings. A few situations show what obscurity means for every partner. It shows the vital contemplations for procedural and applied changes for moral audit for medical care-based Machine learning research [58]. It is, for sure, a tricky part of innovation. We imagine a new structure and approach are required to endorse AI frameworks. Yet, professionals and emergency clinics utilizing it should be prepared and have an outstanding obligation for its utilization. Clinical gadgets-based AI will work with the navigation and complete the people's treatment and methodology, not supplant them. There is a shortage of writing in such a manner, and a nitty gritty casing work should be created by the most influential groups of strategy providers. Artificial intelligence frameworks shouldn't just treat patient information reasonably and fairly but not influence comparative gatherings in various ways. Moreover, to dispose of predisposition in research and clinical practice, inclusivity is one more idea to integrate into the plan of AI frameworks. To advance decency and inclusivity, specialists, designers and coders should practice comprehensive ways of behaving yet come from different foundations with a shifting set

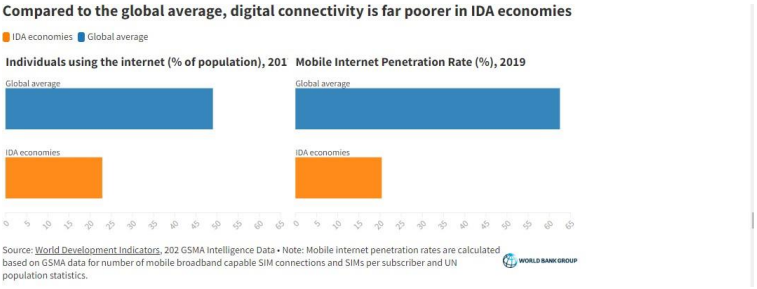


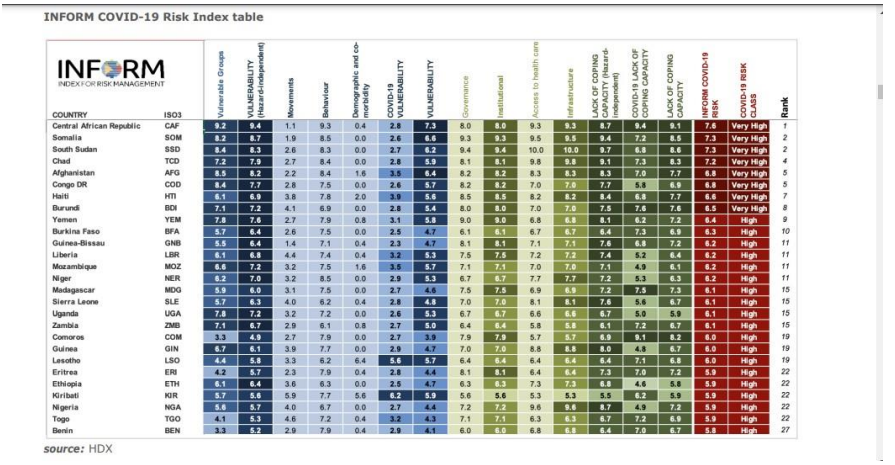
Fig. 7: Global data in terms of internet connectivity

of encounters. The plan and improvement of moral AI innovation frameworks should incorporate info and criticism from individuals with research, clinical, regulatory/functional, and so on foundations, as this will commonly help the patients and eventually reception of such innovation [59]. Furthermore, AI frameworks can expand admittance to preliminary clinical data, instruction, taxpayer-driven organizations, and social and financial open doors, developing the potential for a more comprehensive and various exploration study or clinical best practice. The utilization of AI in imaging suggests that a person in geographic or distant areas could have an ultrasound, for instance, by an untalented specialist and precisely determined before to have AI and alluded to an expert. This AI model is possibly extraordinary for the patient, clinician, and well-being framework.

3 Data collection for the study

The accurate data for this study will be acquired from the national database and some scholarly review articles. Additionally, some qualitative research will be carried out on the World Health Organization members through telephonic interviews to get accurate and real-time data for that case. The researcher conducted the research through the world online library and utilized different databases available within the library, such as Business Source Premier, to find related research papers about the. Preferably the peer-review research papers are the best after reviewing the theoretical section about the importance of this study. Apart from the scholarly articles from the library, the researcheralso utilized a few research papers regarding AI and Big data, which provided additional information to examine as part of the study. The data shows that some areas were technologically updated while some were not; thus, it would be pretty challenging for that that are far away in terms of technology updates to make use of Artificial Intelligence and big data techniques when it comes to conducting treatment and any other thing that regards COVID-19 treatment and prevention. Also, according to the data, only a few people got informed about Covid-19 in the first phase of its prevalence, a clear way of statingthat there is a clear transfer of data and information as far as technology and connectivity are concerned in this case. Thereby putting a lot of people at

too much risk of the same. Poverty is another factor that led to the failure of implementing Artificial Intelligence and Big data in the world. Most people in the world will not be able to afford medical care integrated with the new technology because it tends to be much more expensive for them to afford.



INFORM COVID-19 Risk Index table

INFORM
INDEX FOR RISK MANAGEMENT

COUNTRY	ISO3	Vulnerable Groups	VULNERABILITY (Hazard-independent)	Movements	Behaviour	Demographic and co-morbidity	COVID-19 VULNERABILITY	VULNERABILITY	Governance	Institutional	Access to health care	Infrastructure	LACK OF COPING CAPACITY (Hazard-independent)	COVID-19 LACK OF COPING CAPACITY	LACK OF COPING CAPACITY	INFORM COVID-19 RISK	COVID-19 RISK CLASS	Rank
Central African Republic	CAF	9.2	9.4	1.1	9.3	0.4	2.8	7.3	8.0	8.0	9.3	9.3	8.7	9.4	9.1	7.6	Very High	1
Somalia	SOM	8.2	8.7	1.9	8.5	0.0	2.6	6.6	9.3	9.3	9.5	9.5	9.4	7.2	8.5	7.3	Very High	2
South Sudan	SSD	8.4	8.3	2.6	8.3	0.0	2.7	6.2	9.4	9.4	10.0	10.0	9.7	6.8	8.6	7.3	Very High	2
Chad	TCD	7.2	7.9	2.7	8.4	0.0	2.8	5.9	8.1	8.1	9.8	9.8	9.1	7.3	8.3	7.2	Very High	4
Afghanistan	AFG	8.5	8.2	2.2	8.4	1.6	3.5	6.4	8.2	8.2	8.3	8.3	8.3	7.0	7.7	6.8	Very High	5
Congo DR	COD	8.4	7.7	2.8	7.5	0.0	2.6	5.7	8.2	8.2	7.0	7.0	7.7	5.8	6.9	6.8	Very High	5
Haiti	HTI	6.1	6.9	3.8	7.8	2.0	3.9	5.6	8.5	8.5	8.2	8.2	8.4	6.8	7.7	6.6	Very High	7
Burundi	BDI	7.1	7.2	4.1	6.9	0.0	2.8	5.4	8.0	8.0	7.0	7.0	7.5	7.6	7.6	6.5	Very High	8
Yemen	YEM	7.8	7.6	2.7	7.9	0.8	3.1	5.8	9.0	9.0	6.8	6.8	8.1	6.2	7.2	6.4	High	9
Burkina Faso	BFA	5.7	6.4	2.6	7.5	0.0	2.5	4.7	6.1	6.1	6.7	6.7	6.4	7.3	6.9	6.3	High	10
Guinea-Bissau	GNB	5.5	6.4	1.4	7.1	0.4	2.3	4.7	8.1	8.1	7.1	7.1	7.6	6.8	7.2	6.2	High	11
Liberia	LBR	6.1	6.8	4.4	7.4	0.4	3.2	5.3	7.5	7.5	7.2	7.2	7.4	6.2	6.4	6.2	High	11
Mozambique	MOZ	6.6	7.2	3.2	7.5	1.6	3.5	5.7	7.1	7.1	7.0	7.0	7.1	4.9	6.1	6.2	High	11
Niger	NER	6.2	7.0	3.2	8.5	0.0	2.9	5.3	6.7	6.7	7.7	7.7	7.2	5.3	6.3	6.2	High	11
Madagascar	MDG	5.9	6.0	3.1	7.5	0.0	2.7	4.6	7.5	7.5	6.9	6.9	7.2	7.5	7.3	6.1	High	15
Sierra Leone	SLE	5.7	6.3	4.0	6.2	0.4	2.8	4.8	7.0	7.0	8.1	8.1	7.6	5.6	6.7	6.1	High	15
Uganda	UGA	7.8	7.2	3.2	7.2	0.0	2.6	5.3	6.7	6.7	6.6	6.6	6.7	5.9	5.9	6.1	High	15
Zambia	ZMB	7.1	6.7	2.9	6.1	0.8	2.7	5.0	6.4	6.4	5.8	5.8	6.1	7.2	6.7	6.1	High	15
Comoros	COM	3.3	4.9	2.7	7.9	0.0	2.7	3.9	7.9	7.9	5.7	5.7	6.9	9.1	8.2	6.0	High	19
Guinea	GIN	6.7	6.1	3.9	7.7	0.0	2.9	4.7	7.0	7.0	8.8	8.8	8.0	4.8	6.7	6.0	High	19
Lesotho	LSO	4.4	5.8	3.3	6.2	6.4	5.6	5.7	6.4	6.4	6.4	6.4	6.4	7.1	6.8	6.0	High	19
Eritrea	ERI	4.2	5.7	2.3	7.9	0.4	2.8	4.4	8.1	8.1	6.4	6.4	7.3	7.0	7.2	5.9	High	22
Ethiopia	ETH	6.1	6.4	3.6	6.3	0.0	2.5	4.7	6.3	6.3	7.3	7.3	8.0	4.6	5.8	5.9	High	22
Kiribati	KIR	5.7	5.8	5.9	7.7	5.6	5.2	5.9	5.6	5.6	5.3	5.3	5.5	6.2	5.9	5.9	High	22
Nigeria	NGA	5.8	5.7	4.0	6.7	0.0	2.7	4.4	7.2	7.2	9.6	9.6	8.7	4.9	7.2	5.9	High	22
Togo	TGO	4.1	5.3	4.6	7.2	0.4	3.2	4.3	7.1	7.1	6.3	6.3	6.7	7.2	6.9	5.9	High	22
Benin	BEN	3.3	5.2	2.9	7.9	0.4	2.9	4.1	6.0	6.0	6.8	6.8	6.4	7.0	6.7	5.8	High	27

source: HDX

Fig. 8: Inform Covid-19Risk Index table [60]

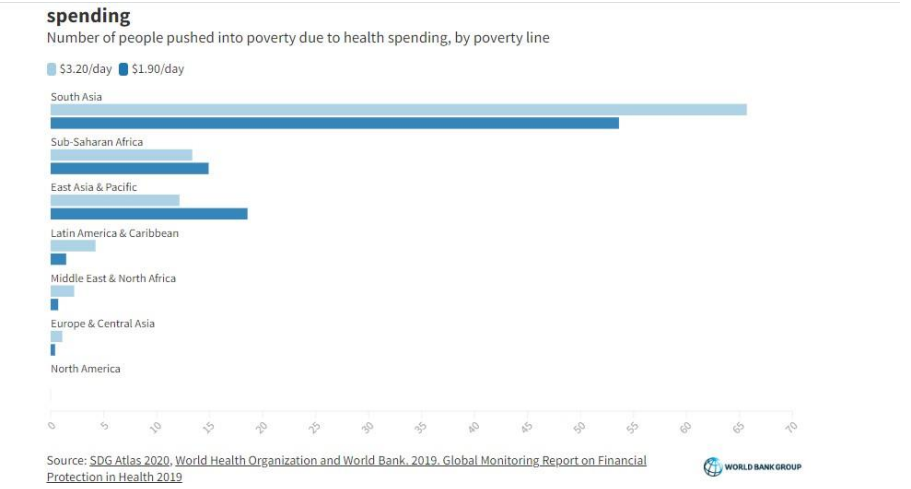


Fig. 9: Poverty Analysis [61]

4 Future Research Challenges

Some potential future research challenges that could be explored in a review paper on the use of AI and big data in healthcare, specifically in the context of disease outbreaks.

1. **Developing more accurate predictive models:** While AI has shown promise in predicting the spread of diseases like Covid-19, there is still room for improvement in the accuracy of these models. Future research could explore how to refine these models by incorporating additional data sources or by improving machine learning algorithms.
2. **Ethical considerations:** As AI becomes more prevalent in healthcare, it is important to consider the ethical implications of using these tools. For example, there may be concerns about the use of patient data, or about how decisions made by AI models could impact patient care.
3. **Improving data collection and standardization:** To make the most of AI and big data in healthcare, it is important to have high-quality, standardized data. Future research could explore how to improve data collection methods, as well as how to standardize data across different healthcare systems and regions.
4. **Addressing issues of bias:** One potential drawback of using AI in health- care is that these models may be biased if they are trained on data that is not representative of the overall population. Future research could explore how to mitigate bias in AI models, such as by incorporating more diverse data or by using algorithms that are less susceptible to bias.
5. **Evaluating the impact of AI on healthcare outcomes:** While there is promising evidence that AI can improve healthcare outcomes, more research is needed to fully evaluate the impact of these tools. Future studies could examine how AI is affecting patient outcomes, as well as how it is impacting the overall healthcare system in terms of efficiency and cost-effectiveness.
6. **Exploring the role of AI in pandemic preparedness:** The Covid- 19 pandemic has highlighted the importance of being prepared for future disease outbreaks. Future research could examine how AI and big data can be used to improve pandemic preparedness, such as by predicting the spread of new diseases or by identifying vulnerable populations.

However, the main goal in the future is to learn more generalizable features, or representations of the raw waveform, that can be used for a variety of tasks, such as speaker recognition, speech recognition, and other speech processing applications.

5 Conclusion

Artificial intelligence is the hub that provides thermal cameras with bright screens that measure the temperatures of covid-19 patients in the streets, squares, and stations and send the signal to the personnel responsible for monitoring patients' high temperatures or showing signs of the covid-19 virus. The

monitoring personnel can then eliminate the suspected patients showing signs of the virus and bar them from using the bus or train until the relevant stakeholders that handle the situation take them to the quarantine facilities. Counting affected and recovered patients and monitoring the virus's transmission: Monitoring sickness and prompt activation of AI and CT scans can minimize disease transmission. Mathematics models based on artificial intelligence and process research can track the growth in virus-infected individuals based on equations and assumptions related to variables such as the virus's nature and its effect on high temperatures, population density, relative humidity differences, and different ways of life and differences in physical immunity. Importantly, AI anticipates the Coronavirus in light of these factors, prepares for it, and proposes what should be done in light of this the next time.

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