# Management and Applications of Artificial Intelligence (AI) Concerning the COVID-19 Pandemic. A Descriptive Study

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**Abstract:** The COVID-19 epidemic wreaked havoc on every area of human life, with severe consequences for all sectors of the global economy. The pandemic slowed and reversed advances in health, resulting in shorter life expectancy, particularly in poor and underdeveloped countries. Machine learning and artificial intelligence, on the other hand, played a significant role in the global response to the pandemic. As a result, the current research sought to evaluate the role of artificial intelligence and machine learning in tackling the threats posed by the COVID pandemic, intelligence and machine learning had a significant part in the response to the COVID-19 pandemic's issues. Among other notable accomplishments, artificial intelligence, machine learning, and various digital communication tools through telehealth played important roles in scaling customer communications, providing a platform for understanding how COVID 19 spreads, and speeding up COVID-19 research and treatment. The takeaway is that, the role of artificial intelligence and machine learning motivates us to conclude that governments must build trust in these technologies in order to address future health issues and ensure that sustainable development goals related to good health and wellbeing are met.

**Keywords:** Artificial Intelligence, COVID-19, Patient control, Diagnose

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## 1. Introduction

The COVID-19 epidemic had an impact on people's lives and businesses all around the world. The psychosocial environment was changed substantially due to isolation, economic shutdowns, social separation, among other constraints, and these changes seriously affected countries [1]. Adolescents, children, and families were all severely impacted. Due to social separation, leisure activities were limited, schools and kindergartens were closed, and social connections were also curtailed. Parents, on the other hand, were overworked, assisting their children with academics, and many worked from home. Apart from the issues posed by the economic downturn, unemployment had a significant impact on people's mental health [1]. Razu et al. [1] also mentioned that the pandemic put a lot of strain on healthcare workers who had to treat COVID-19 patients. All healthcare personnel were at high risk of getting the virus, which had a negative impact on their psyche, as well as professional stress, fear of infection, and feelings of helplessness [2]. Fagherazzi et al. [3] also stated that the virus had the greatest influence on healthcare systems around the world, as they were expected to respond to the increase in demand in the shortest amount of time. Digital health solutions, according to Fagherazzi et al. [3,] had acquired a certain level of maturity, but they were not generally deployed or acknowledged in the sector, and they played a big part in the crisis response. In some ways, the pandemic served as a catalyst for health professionals to consider how digital health technologies may and should be used to tackle the epidemic. Medical 4.0, according to Haleem and Javaid [4,] is one of the important technologies that could aid in the fight against the pandemic. Medical 4.0, according to Haleem and Javaid [4, has several uses of sophisticated technologies that can help handle the issues of the COVID-19 pandemic. As a result, artificial intelligence (AI) and machine learning are increasingly being used in COVID-19 research. According to Islam et al. [5] , AI has been used in COVID-19 research for diagnosis, classification, detection, severity, and mortality risk. Islam et al. [5] went on to say that the use of AI and machine learning has been increasing even before the outbreak. To tackle complicated jobs efficiently and effectively, sophisticated AI algorithms have been developed [6]. During the COVID-19 pandemic, AI became one of the most important instruments for tracking and regulating the virus's progress. Medical personnel began looking for tools to monitor and control the pandemic, according to Senthilraja [6]. Harrus and Wyndham (2021) [7] pointed out. However, that those technologies inevitably have intended and unforeseen repercussions. However, AI's promise has been demonstrated in its application in mitigating the harmful consequences of the global epidemic. When the pandemic hit China, the number of AI applications skyrocketed. According to Harrus and Wyndham [7], the COVID-19 epidemic was a catalyst for AI practitioners' salvation or

redemption. The epidemic provided a once-in-a-lifetime opportunity to demonstrate that AI may be used to help humanity. However, just like the pandemic, difficulties linked with the use of technology continued. According to Harrus and Wyndham [7], the deployment of AI in the fight against COVID-19 aggravated existing challenges affecting the poor. The COVID-19 epidemic worsened social inequality around the world. Because of various issues such as a lack of data and challenges related to universal acceptance for telemedicine, among other things, the use of technology such as AI did little to address the disparities that existed prior to the pandemic, such as lack of access to healthcare, resource inequalities, and disparities in the quality of care received did not improve significantly, especially for the most vulnerable communities of society. Cashiers, cleaning crews, delivery services, restaurant servers, and trade employees and their families, for example, were exposed to the virus in larger proportions than other groups in other occupations, according to statistics from The American Public Media Research Lab. Healthcare personnel, teachers, and nursing home employees, among others, were also heavily exposed. Despite the fears and the pandemic's bad consequences for humanity, Senthilraja [6] stated that AI was important in tracking the virus's transmission, identifying high-risk patients, and controlling the epidemic in real time. Senthilraja [6] went on to say that AI assisted in the prediction of mortality risk by analyzing previous patient data effectively. Senthilraja [6] also mentioned how AI assisted in the fight against COVID-19 by screening patients, doing medical examinations, and informing and recommending infection prevention. AI assisted in the planning and treatment of COVID-19 patients once again [6]. The use of AI to address the impact of the COVID-19 pandemic, according to Islam et al. [5,] improved diagnosis, classification, detection, severity, and mortality risk. Another study by Vaishya et al. [8] claimed that new advanced technologies, such as AI, the internet of things, big data, and machine learning, are needed to help healthcare in general. Vaishya et al. [8] identified through a research of the literature that many apps were used in detecting clusters of COVID-19 cases and predicting where the virus would influence in the future by collecting and analyzing historical data. According to Vaishya et al. [8], decision-making technologies such as AI are crucial in the handling of viruses and extremely useful in the development of vaccines. Another study by Khan et al. [9] shown that AI has been effective in addressing the negative consequences of the deadly COVID-19 epidemic. Khan et al. [9] discovered that AI was used for COVID-19 pandemic detection, screening, classification, drug repurposing, virus prediction, and forecasting. In this context, the current study aims to evaluate the role of AI and machine learning in combating the COVID-19 pandemic and speeding up COVID-19 research and treatment.

## 2. Statement of the problem

After the widespread spread of Covid-19 in the world and the increase in human losses, it has become imperative to seriously think about reducing losses by using unconventional methods of treatment, including the use of artificial intelligence, which is one of the ways that scientists who work in the field of programming, designing applications and inventing New devices that depend on artificial intelligence.

## 3. Research Importance and Objectives

In this study, we aim to know artificial intelligence, its history, its negative and positive aspects, in addition to the most important applications used in treating the Covid-19 epidemic that swept the world in a short time and led to great losses, including data analysis, forecasting of patients' status and assistance in manufacturing New drugs that depend on the huge amount of data collected from patients in all countries of the world, but the doctor's role remains essential in treating the problem.

## 4. Purpose of the study

In this study, we aim to know the most devices and applications in which artificial intelligence is used in the treatment of Covid-19, which has become a global problem because it is increasing in ferocity and the number of deaths is constantly increasing and there is no effective treatment for it, so we present in our research this the most important applications and methods that are used in minimizing losses and ultimately helping to find an effective treatment. The speed of spread and a large number of victims led to great losses, which led political officials to ask engineers and programmers to design new applications and invent devices capable of monitoring patients after the number of doctors and medical personnel who contracted this disease increased.

## 5. Literature Review

Artificial intelligence's impact on COVID-19 is becoming more well-documented, which is positive. Senthilraja [6], Adadi et al. [24], and Islam et al. [5], among many others authors, have highlighted how AI has been used in health, particularly in addressing COVID-19's impact. However, there is consistency in the application of AI in health in the literature examined, particularly in tackling the harmful effects of COVID-19. The current study aims to assess the impact of artificial intelligence (AI) and machine learning in combatting the COVID-19 pandemic and accelerating COVID-19 research and treatment, with a focus on good health and well-being. Senthilraja [6] discovered that AI is crucial in countering COVID-19's detrimental consequences. Senthilraja [6] discovered that

AI has been used to predict activity such as physicochemical parameters. Senthilraja [6] discovered that AI was useful in the treatment and monitoring of COVID-19 patients' health. COVID-19 has been tracked using artificial intelligence at numerous scales, including medicinal, biological, and epidemiological applications. Senthilraja [6] also suggested that AI has aided COVID-19 research by assisting in data analysis and medication development. Senthilraja [6] provides evidence that AI has assisted in addressing COVID-19's harmful implications. Another study by Adadi et al. [24] found that AI played a significant impact in the COVID-19 pandemic response. According to Adadi et al. [24], the increased interest in applying AI to address COVID-19 issues has resulted in a boost in AI research, which has resulted in an increase in the number of articles and review studies published in a short period of time. The application of AI in health has been on the rise, according to a study by Islam et al. [5], and the rate has been accelerated by the COVID-19 epidemic. Yu et al. [25] have mentioned how AI is influencing medical practice. The progress being made in big data capture, machine learning, and computer infrastructure development, according to Yu et al. [25], is one reason for the increased usage of AI in the health industry. Due to advancements in data collecting and increased computer power, Yu et al. [13] suggest that AI is now being used in domains that were previously reserved for humans. Another investigation by Davenport and Kalakota [26] backed up the claims made by Yu et al. [25]. (2018). According to Davenport and Kalakota [26], the explosion of data in healthcare is forcing AI to be used in the field. According to Davenport and Kalakota [26], AI is being used in therapy suggestion and diagnosis, as well as in patient engagement and adherence, and even for administrative purposes. Even while AI can already be used in many situations, including those formerly performed by people, Davenport and Kalakota [26] pointed out that several technical limits will make it hard to completely replace humans very soon. . Reddy et al. [27] presented reasons in favor of Yu et al. [25] and Davenport and Kalakota's [26] theories. According to Reddy et al. [27], AI technology has advanced at an exponential rate in recent years, with the development of deep neural networks, robotics, computer vision, and natural language processing. All of these AI technologies are being utilized in healthcare, according to Reddy et al. [27], to the point where, in the next years, AI will likely take over the duties of clinicians and administrators. Even though AI will play a critical role in the delivery of healthcare, Reddy et al. [27] argued that it is inaccurate to conclude that AI will take over and replace human clinicians, but AI will have a significant impact on clinical decision support, health interventions, patient monitoring, and patient administration. According to Reddy et al. [27], AI will be crucial in AI-enabled or AI-augmented health systems. Sipior [28] further claimed that AI is playing a critical part in the

fight against COVID-19, and that it is contributing speedy answers to problems that were previously hard to solve in a variety of sectors and applications. Since the outbreak of COVID-19, according to Sipior [28], there has been a spike in the exploration and usage of AI, as well as many data analysis tools, in a variety of fields. Planning, the danger of biased outcomes, the necessity of data, and diversity in AI team membership are just a few of the management factors Sipior [28] addressed for the successful deployment of AI systems. Finally, Sipior [28] concluded that, since humanity seeks speedy solutions, there is a need for thorough examination of challenges related with the creation and usage of AI. The role of AI in the analysis, prevention, and combat against COVID-19 and other pandemics was also discussed by Vaishya et al. [8]. Through the collection and analysis of data, Vaishya et al. [8] observed that AI has been used in seven distinct ways, including the detection of cluster cases and the prediction of where the virus would have a large influence in the future. AI can potentially play a key role in vaccine development, prediction, and tracking of present and prospective patients, according to Vaishya et al. [8]. It was also mentioned that AI is particularly good at simulating human-like intellect. In this research review, AI is shown to be quite effective in tackling COVID-19-related issues. The question remains: what are the lessons we're learning through the use of AI to combat COVID-19's effects?

## 6. AI in Condensed Form

The term "artificial intelligence" has much popularity in recent years; some people are concerned because it leads to monitoring the machine and reducing the role of humans and increasing unemployment in society. What exactly artificial intelligence? What are the biggest significant indicators? Wayne arrived?

Artificial intelligence is defined as the intelligence demonstrated by machines and Software and application in a way that simulates human mental capabilities and work patterns, such as the ability to learn, conclude, and react to situations not programmed in the machine. It is also the name of an academic field concerned with how to create computers and programs capable of intelligent demeanor.

Its definition is the behavior and characteristics of computer software that allows them to simulate human capabilities and work patterns, and in particular the ability to conclude, learn, and respond to attitudes that have not been programmed in the computer, medical diagnosis, natural language processing, translation and human beings.

Artificial intelligence has seen many developments during its short period of existence. It can be summarized in six stages. At first, with the euphoria of innovation and the first successes, researchers were drawn into somewhat exaggerated statements and were subsequently targeted with much criticism. For

example, in 1958, the American Herbert Simon, who later won the Nobel Prize for Economics, stated that within ten years the machine would become a world champion in the game of chess if it was not excluded from international competitions. By the mid-1960s, the pace of progress had faltered. A 10-year-old boy beat a computer at a game of chess in 1965. A report issued by the US Senate in 1966 noted the inherent limitations of machine translation. The AI was exposed to negative publicity for ten years. Despite this, the research did not stop, but it took new directions. Attention was focused on psychology related to memory and on the mechanisms of understanding to try to simulate it on the computer, as was the role of knowledge in logical thinking. This led to the emergence of techniques for the semantic representation of knowledge that developed greatly in the mid-1970s, and which also led to the development of so-called expert systems - so named because they may require the use of expert knowledge of professionals to reproduce their way of thinking. These systems raised great hopes in the early eighties thanks to the numerous applications that were produced, for example, medical diagnostics. Improving technologies has led to the design of machine learning algorithms that enable computers to accumulate knowledge and automatically reprogram it based on their own experiences. This has led to the emergence of industrial applications (fingerprint identification, speech recognition, etc.), where there are technologies derived from artificial intelligence, informational, artificial life, and other disciplines, to provide hybrid systems. As of the late 1990s, artificial intelligence was linked to robots and the human-machine interface, to produce smart computers that suggest emotional states and feelings. This has led, for example, to an emotion count (affective computing) that assesses an individual's reactions to feelings resulting from his feelings to reproduce them on the machine, and in particular to the development of robots capable of conversation. Since 2010, thanks to the power of the machine, big data can be harnessed by deep learning techniques that rely on the use of shape neural networks. The emergence of fruitful applications in many fields (speech recognition, image recognition, natural language understanding, self-driving cars, etc.) leads us to talk about the rise of artificial intelligence. The developing coronavirus (COVID-19) is one of the most contagious diseases that have ravaged our planet in recent decades, and while it is not the deadliest, it is the most ubiquitous, having spread to over 189 nations in less than three months from its discovery in China. Current AI technologies have shown to be highly valuable in tracking the spread of the virus, identifying patients, cleaning locations, and speeding up the process of discovering an effective vaccine as governments and health organizations struggle to contain the spread of the infection. BlueDot analyzes data from hundreds of sources using natural language processing techniques and machine learning to detect viral epidemics early and predict their

spread. The program monitors news reports in nearly every language, animal and plant disease networks, satellite-based climate data, and official statements to offer alerts about places where the virus could spread. As soon as the new Coronavirus was discovered, researchers tracked global airline ticket data to see whether they could forecast the path and timing of the infected population's next movement. In the days following its first appearance, it correctly predicted that the virus would move from Wuhan to Bangkok, Seoul, Taipei, and Tokyo. Hundreds of professionals in a variety of fields, including geographic information systems, spatial analysis, data visualization, and computer science, as well as medical experts in infectious illnesses, tropical medicine, and public health, work with the company. These professionals sift the automated data and perform the final analysis; epidemiologists then check that the conclusions are logical from a scientific standpoint before sending the reports to the government, business, and public health. Anyone with a temperature higher than 37.3 degrees is detected by the technology, which is now in use at Beijing Qing the Railway Station. Alibaba, a Chinese corporation, has also created an artificial intelligence system that can detect the virus in a CT scan of the chest. According to the researchers who created the system, it can diagnose a patient with 96 percent accuracy, has been trained on data from 5,000 cases of the virus, and can do the test in 20 seconds instead of the 15 minutes it takes a human specialist to diagnose a patient. It can also distinguish between the developing coronavirus (COVID-19) and conventional pneumonia swiftly, and roughly 100 hospitals in China are said to be using it presently. The researchers used the company's supercomputer known as Summit to examine 8,000 compounds that are more likely to bind to the main protein in the Coronavirus and make it unable to attach to host cells in the human body, and they have identified 77 compounds that can now be tested experimentally to develop an effective vaccine for the virus. Types of artificial intelligence follows: See the Figure 1. The most basic AI system is simply interactive, with no ability to create memories or draw on previous experiences to make current decisions. That type of artificial intelligence, which incorporates a computer, is capable of directly perceiving the environment and acting on what it sees, rather than relying on previous notions about the universe. Rodney Brooks, an artificial intelligence researcher, argued in his research paper that we should only build machines like these, and his main motivation was that humans aren't very good at programming simulated worlds accurately enough for a computer to use them, which is referred to as "simulating/modeling the world" in the field of artificial intelligence. Machines that can analyze the past, such as self-driving automobiles, fall into this group of the second type. The speed and direction of other cars, for example, are watched. This cannot be done in a single moment, but it does need defining particular goals and tracking them over time. Can we create

artificial intelligence systems that can create realistic simulations, recall their past experiences, and adapt to new situations? Brooks was correct in characterizing this as extremely difficult, as his study into these strategies is brilliant. We can pause at this point and refer to it as the critical gap between the machines we have now and the machines we will construct in the future. However, we should be more specific about the types of virtual machines we want to create and what they should look like. Machines will become more advanced in the future, and they will be able to form perceptions not only of the world, but also of other factors or entities in the world. This is known as the theory of mind in psychology, and it is the belief that humans, beings, and bodies in the world can have thoughts and feelings that affect their behavior. Building systems that can shape their own perceptions is the final step in AI development. Finally, artificial intelligence researchers will be able to comprehend consciousness and create computers that possess it. Consciousness is also known as self-awareness for a reason, and it is in some ways an extension of the theory of mind given to the third type of artificial intelligence. "I desire that item," as opposed to "I know I want that item," is a completely different phrase. Conscious beings are aware of themselves and their inner states, as well as their ability to predict others' feelings. Let's imagine someone follows us in traffic and appears irritated or angry, because that's how we feel when we complain to others. These kinds of conclusions are impossible to reach without a theory of mind. While we are still a long way from constructing self-aware computers, we must concentrate our efforts on understanding memory, learning, and the ability to make judgments based on prior experiences, which is a crucial step in comprehending human intelligence.

We mention the most important applications and devices used in artificial intelligence to monitor and analyze disease data, Covid-19, see Figure 2. Artificial intelligence can quickly assess patients' unusual symptoms and alert health-care authorities to the disease's presence, resulting in a faster decision-making process that, in turn, aids the development of a new COVID-19 diagnosis and management system. Artificial intelligence, using a smart platform, can automatically monitor and predict the spread of this virus, as well as assist in the proper monitoring and treatment of individual infected people, because it has the ability to provide daily services and patient data updates, as well as provide solutions for the COVID-19 pandemic. Because it has the ability to provide daily services and patient data updates, as well as provide solutions for the COVID-19 pandemic, artificial intelligence using a smart platform can automatically monitor and predict the spread of this virus, as well as assist in the proper monitoring and treatment of individual infected people.

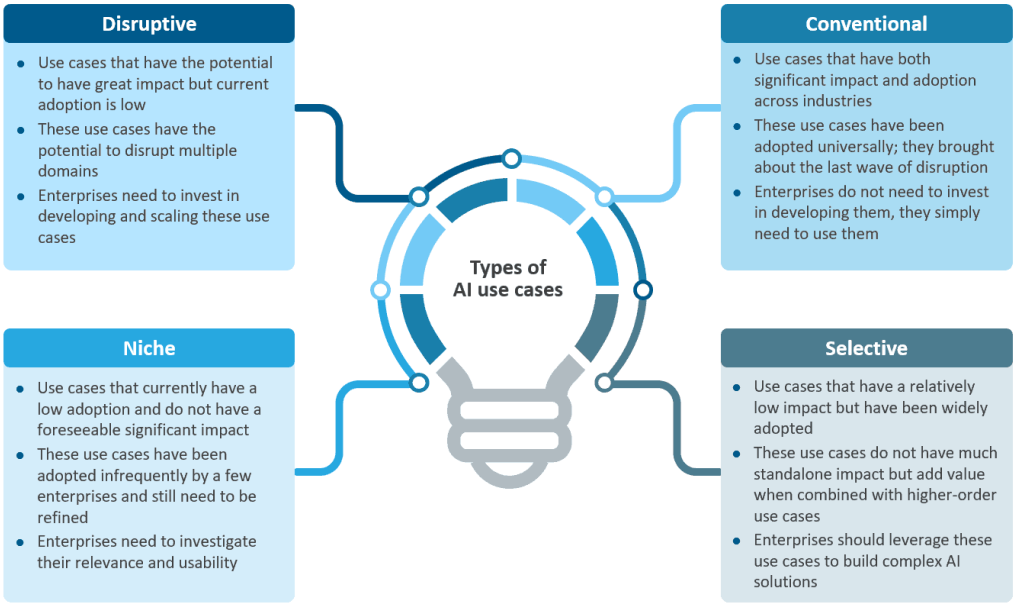


**Figure 1: Types of artificial intelligence**

This artificial intelligence can track the virus's nature and anticipate it based on existing data, as well as predict the risks of infection and its future spread. It can also predict the number of positive cases and deaths, as well as the impacted locations and newly infected people. Artificial intelligence-based medical devices are designed to be able to follow patients with extreme accuracy, which leads to reducing the workload of doctors and health staff after they have worked for long periods due to the presence of large numbers of injured. Due to a large number of patients, doctors and accompanying staff became vulnerable to injury and many of them were injured, so it is good to have a special monitoring device that plays the role of the doctor and medical staff. Artificial intelligence can predict to patients the presence of detailed data for them, which is important for the doctor and medical staff to be able to treat the situation in such a way that it does not lead to a risk of infection and disease disclosure to the community as a whole and reduce the rate of injuries if the prediction is one of the most important characteristics of artificial intelligence.

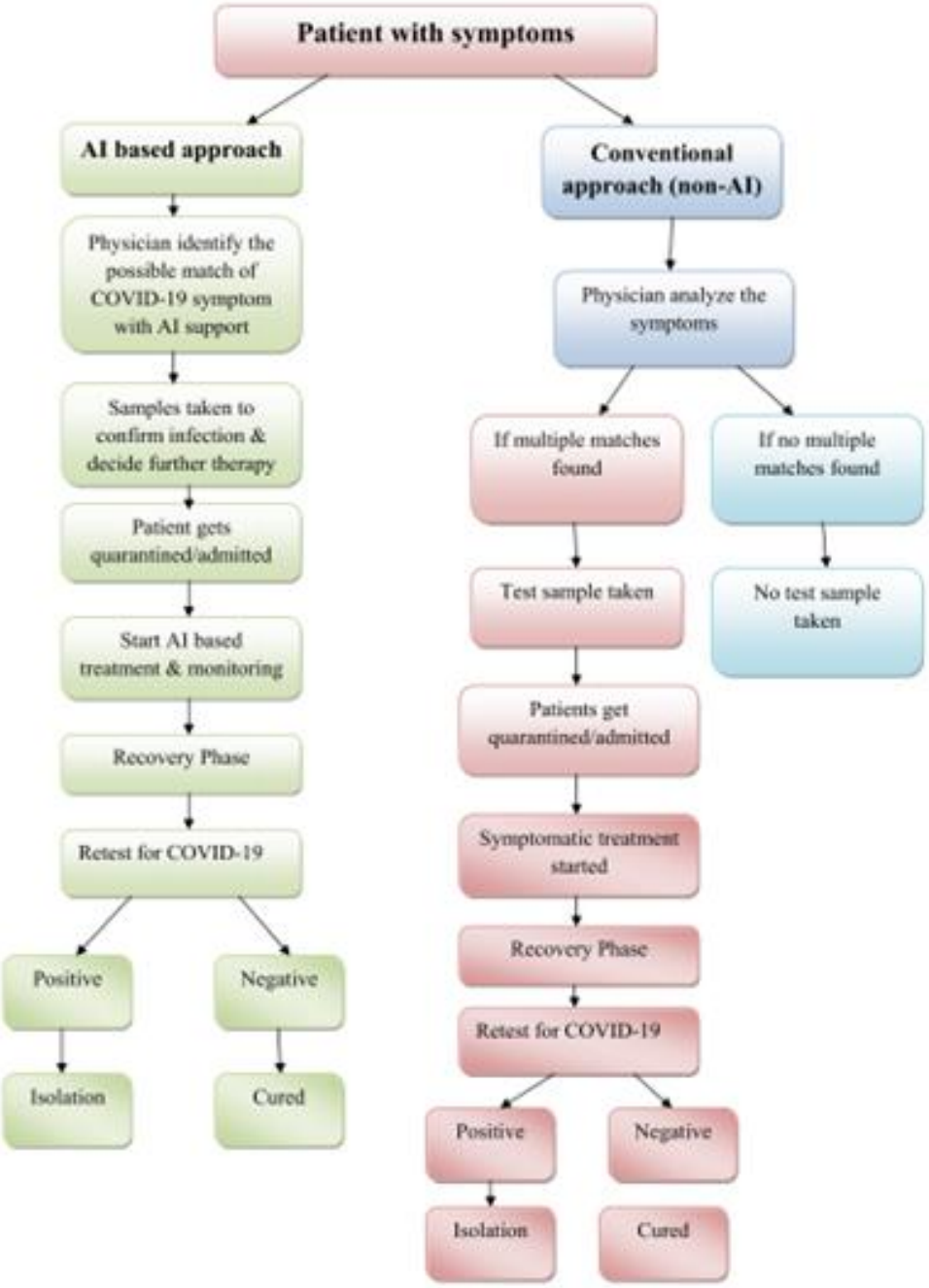


**Figure 2: The basic approach for using AI and non-AI based technologies to assist general practitioners in identifying COVID-19 symptoms**

## 7. Methods

The role of AI in combating the COVID-19 Pandemic was investigated in this study using secondary desktop research. In this study, qualitative content analysis was used. Content analysis, according to Stemler [29], is "a systematic, repeatable technique for condensing many words of text into fewer content categories based on clear coding principles." Content analysis, according to Prasad [30], is "the scientific investigation of the content of the communication." "Content analysis is the study of the content of the meanings, contexts, and intents conveyed in messages, according to Prasad [18]. According to Stemler [29], content analysis, as a methodological technique, can be one of the most powerful tools that researchers can employ successfully and efficiently in the era of big data. Stemler [29] believes that content analysis can be used to a variety of data types, including text, audio, and visual data. The technique of content analysis looks to be more effective because there has been a large boom of COVID-19 study on numerous themes, including the role of AI in resolving COVID-19's negative consequences. Because the data on COVID-19 comes in a variety of formats, including photographic, video, audio, and text, content analysis has proven to be a useful tool. This is due to the fact that content analysis may be used to a variety of data sources, including textual data, visual stimuli like images or video and even audio data. According to Stemler [29], the content analysis method is extremely versatile because it can be empirically or theoretically driven. The table above summarizes all of the sources used in the content analysis. Journal papers from various journals, reports, and media stories are among the documents.

**Table 1: Summarizes all of the sources used in the content analysis**

| Articles in Journals | Reports related COVID-19 | Articles in Media | Others related COVID-19 |
|---|---|---|---|
| 110 | 30 | 30 | 56 |
| Journals from the year 2000 onwards were targeted, while work from previous years was also evaluated.<br><br>Publishers include Springer, Multidisciplinary Publishing, Scopus, Elsevier, and the Institute of Computer and Electronics Engineers, among others. | The United Nations, the World Bank, the World Health Organization, and the Organization for Economic Co-operation and Development (OECD) are just a few of the organizations that are involved. | Various countries' media pieces were used, including the United States of America, South Africa, and the United Kingdom among others. | To come up with the ideas that defined the study's course, various other documents were studied. |

## 8. Results

The power of AI has been one of the processing and detecting technologies from the beginning of the COVID-19 pandemic. Artificial intelligence (AI) has been used in the health strip for a variety of objectives, including drug research and approval, population monitoring, and other important applications include disease predictions. The outbreak of the pandemic prompted a spike in the deployment of AI applications to combat the virus's harmful repercussions. The sections that follow will detail the areas where AI was used to address the virus's detrimental effects. It's worth noting that the increased availability of Big Data made all of these AI and machine learning applications viable.

### 8.1. Accelerating COVID-19-related complications research and treatment

The development of COVID-19 vaccines is one area where AI has proven to be successful and efficient in the fight against COVID-19. AI was crucial in the development of the COVID-19 vaccinations, as well as the identification of old vaccines that can be repurposed into novel vaccines and therapies [7]. Drug and vaccine development is a lengthy process that incorporates various basic science fields such as biology, chemistry, and pharmacology [7, 31].

The classic drug development process is depicted schematically in Figure 2. Target selection, compound screening, and lead identification were among the challenges that needed 3–6 years of research and development. Clinical studies take 4–7 years to complete, with preclinical trials requiring about a year. Drug approval and review often take one to two years.

According to the FDA [32], only one in a thousand medications normally move through preclinical testing to clinical trials out of the hundreds of thousands of chemical compounds that are generated and tested to find the one that fits the standards. The FDA [32] also mentioned that just one out of every ten medications that make it to phase 1 of clinical trials will be developed for commercialization. According to DiMasi et al. [33], it takes roughly ten years and more than 2.5 billion dollars to develop a medicine that is authorized by the US Food and Drug Administration.

Pharmaceutical companies had to come up with additional novel approaches to develop COVID-19 vaccines in light of the COVID-19 pandemic, which will help to lower costs and shorten the timeframe for combating the COVID-19 pandemic. Harrus and Wyndham [7] claim that AI has proven to be one of the tools that can aid in the creation of medications, reducing the time and expenses required. According to Harrus and Wyndham [7], the power of AI-based algorithms in drug research became apparent in mid-2010. To reap the benefits of AI in drug research, a number of pharmaceutical corporations have purchased, merged, or formed partnerships with AI-focused software companies. According to Smalley

[34], AI-based algorithms can be employed in the early stages of drug development to limit the number of compounds investigated and exclude medications that are suspected of causing adverse effects.

The COVID-19 pandemic, according to Harrus and Wyndham [7], enhanced the use of AI in medication discovery and repurposing of existing treatments. Because the treatments are currently being used with measured and known adverse effects, repurposing of existing drugs has shown to reduce the time it takes for drug approvals.

The approval process will be based on the drug's effectiveness in usage rather than the original purpose for which it was approved. According to Richardson et al. (2019) [35], a company called Benevolent AI, which employs artificial intelligence for drug discovery and identification, came up with the idea of using a rheumatoid arthritis treatment called Baricitinib to treat COVID-19's severe symptoms.

Following the information, Eli Lilly, the drug's manufacturer, formed collaborations with the National Institute of Allergy and Infectious Diseases in the United States, and the clinical studies were successful. It would have been hard to establish a link between the arthritis medicine and COVID-19 without the help of AI [36,37]. AI-based algorithms have proven to be effective in the discovery and repurposing of medications to combat the COVID-19 pandemic's detrimental consequences. Even after the COVID-19 pandemic, Harrus and Wyndham (2021) [7] suggested that research on repurposing and creating medications should expand.

This research on AI's ability to produce and repurpose medications indicates that the Fourth Industrial Revolution and the technologies that drive it, such as AI, have the potential to significantly contribute to the achievement of sustainable development objectives, namely target three.

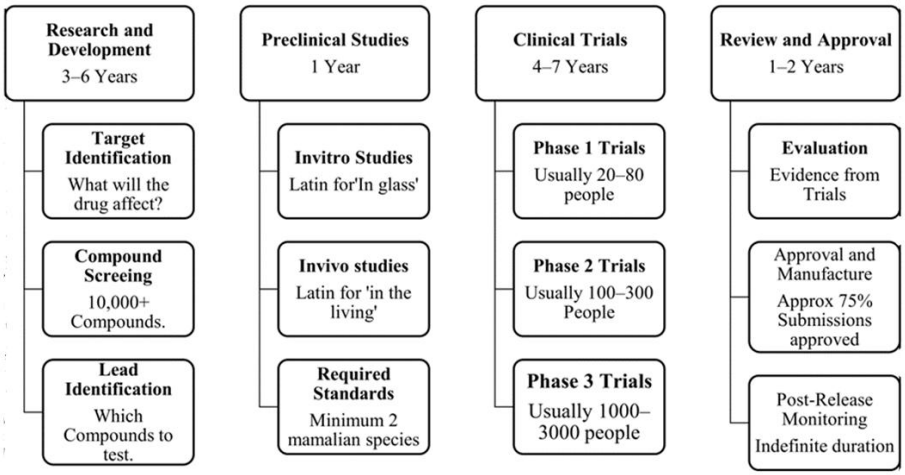


**Figure 3: Process of traditional drug development Analysis by the author Harrus and Wyndham [19]**

### 8.2. During a pandemic, AI can help with forecasting and scaling customer communications

The first AI-powered applications to detect the COVID-19 virus were forecasting applications, and the success of these applications prompted widespread usage of AI in the fight against the COVID-19 pandemic. AI applications were widely employed around the world to provide information about the pandemic. BlueDot, a Canadian health-monitoring company, for example, warned its staff and customers about the likelihood of a new pneumonia-like disease outbreak in China's Wuhan Province. According to Neiiler [38], the information from BlueDot to its clients arrived 10 days before the World Health Organization (WHO) issued a warning, and even seven days before the US Centers for Disease Control and Prevention (CDC). The company was able to apply AI techniques to foresee the onset of the disease and how it would spread thanks to the utilization of big data, both health-related and non-health-related. One of BlueDot's most impressive achievements was its ability to accurately anticipate the cities where the disease would be found next [38]. Another key application of AI was predicting how COVID-19 would spread and the severity of the virus's threat. Li et al. [39], for example, published a study that examined the available data on the Hubei pandemic scenario. Li et al. [39] used the power of big data to anticipate the virus's evolution pattern based on the available data. The study produced controls that were extremely beneficial during the pandemic. Li et al. [39] were able to predict the pandemic's development tendencies in nations including South Korea, Iran, and Italy because to the availability of data. All of this evidence shows that AI was successful in forecasting the propagation of the virus in order

to decrease the infection's transmission and detrimental impacts. Senthilraja [6] stated that AI systems had already detected the virus's outbreak before it was even known to the world and its threats, and that it is critical to continue using AI applications to support the work of policymakers in the medical community and society, so that every stage of the crisis is well managed—even post-pandemic. In some ways, the data presented above only demonstrates that AI has a lot to contribute to the formulation of applicable policies that can aid in the prevention of future pandemics and even the achievement of sustainable development goals [6]. Another area where AI proved to be quite beneficial in the fight against the pandemic was in virus diagnosis, containment, and monitoring.

**8.3. Monitoring, containment, and diagnosis**

One of the equally crucial parts of virus containment was the accurate diagnosis of the infection. With the velocity at which the virus was spreading, one of the areas where the success of controlling the virus lay was diagnosing and screening it quickly. Various AI applications were proposed during the peak of the pandemic, according to Nguyen [40]. These applications were used in a variety of situations, and while some were not successfully implemented on a large scale, they were used in small trials due to difficulties in training efficient and effective AI models using data that did not accurately reflect the population composition on which the AI models were used. Despite these issues, the importance of AI applications expanded since, among other things, speed in detecting COVID-19 cases saved money on hospital bed allocation. According to Zhou et al. [41], applications utilizing various deep learning techniques in China increased to more than 100 as early as March 2020, and these applications were used in Italy as early as April 2020, as reported by [42]. Some AI applications were useful in distinguishing COVID-19 chest Xrays from other forms of infections such as influenza pneumonia, according to Zhou et al. [41]. According to Kondylakis et al. [43], many mobile applications were developed to prevent the harmful effects of the COVID-19 pandemic and to flatten the curve caused by the virus's expanding numbers. Various mobile applications were allegedly utilized for information exchange, self-management of symptoms, contact tracing, making decisions, risk assessment, and home monitoring, according to Kondylakis et al. [43]. Singh, et al. [44] discovered that a variety of mobile health apps were utilized to combat the COVID-19 disease, mostly for contact tracking and symptom monitoring. Patel [33] has hinted at the possibility of using mobile applications for remote first-degree triage of patients taking a cough test for extra screening and medical treatment. Patel [33] has hinted at the possibility of using mobile applications for remote first-degree triage of patients taking a cough test for extra screening and medical treatment. Most of these mobile applications,

according to Patel [45], are essential in reducing unnecessary hospital visits and the overuse of limited medical resources. Senthilraja [6] went on to say that AI can detect and forecast the characteristics of a virus using large data from platforms like social media and even media platforms, as well as the danger of infection and the rate at which the disease spreads. Another essential feature is that AI can forecast positive cases and deaths in any place, which is useful in developing pandemic response strategies.

### 8.4. Understanding how COVID-19 spreads treatments and cures with artificial intelligence

Geofencing or green passports were one of the most popular uses. Before the epidemic, geofencing was a marketing strategy that tracked the location of a telephone to determine the owner's location. This was done in order to make consumers aware of neighboring stores and items. Commercial firms employed geofencing extensively for quarantine purposes during the pandemic. According to Hui [46], geofencing was used in China to keep track of those who were confined. Geofencing was also used to flag diseased regions and provide information to health authorities. All of this was possible because of AI's power [47].

According to Wesner [48], geofencing was not employed in the United States of America because to concerns about restricting freedom of movement and the possibility for abuse for personal gain. In Australia, a vaccine passport was implemented, with all vaccine recipients being registered in a centralized database called the Australian Immunization Register, which contains all people who have been inoculated.

Vaccine passports have been established in Denmark, the European Union, Israel, and the Netherlands. Senthilraja [6] also mentioned how AI has helped with diseases like COVID-19 because of the need for surveillance.

Because human activity, such as migration, was responsible for the virus's spread over the world, there was a need for applications that might assist in tracking people's movements and monitoring the virus's spread. Blue Dot, for example, used AI machine learning and natural language processing to track and report the progress of the virus. Senthilraja [6] also mentioned that AI can help in the treatment and cure of COVID-19-related disorders, particularly when real-time data analysis is used. Data analysis usually produces current information that aids in the prevention of disease spread. AI data can also be used to predict infection areas, virus influxes, and the data supplied by AI can also be used to demonstrate the need for beds and healthcare [6].

Senthilraja [6] also proposed that artificial intelligence (AI) can help avoid future infections by identifying the qualities, causes, and motivations for their development.

## 9. Conclusions

The COVID has slowed and reversed health gains, resulting in a reduction in life expectancy. The COVID-19 has sparked a surge in interest in artificial intelligence and machine learning research. As a result of this increased attention, the number of review studies and articles focusing on the role of artificial intelligence and machine learning in combating the COVID-19 epidemic has increased. As a result, the current study attempted to evaluate the role of artificial intelligence and machine learning in combating the COVID-19 pandemic's threats. The results of qualitative content analysis revealed that artificial intelligence and machine learning had a significant part in the response to the COVID-19 pandemic's issues. Among other major accomplishments, artificial intelligence and machine learning helped scale consumer communications, provided a platform for understanding how COVID-19 spreads, and accelerated COVID-19 research and therapy. The takeaway is that, despite the disruptions and rise in the amount of unintended consequences of technology, there is still hope. The importance of artificial intelligence and machine learning in solving future health concerns leads us to the conclusion that governments must foster trust in these technologies.

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# إدارة وتطبيقات الذكاء الاصطناعي (AI) فيما يتعلق بوباء COVID-19 دراسة وصفية

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**المستخلص:** تسبب وباء COVID-19 في دمار كل مجال من مجالات الحياة البشرية ، مع عواقب وخيمة على جميع قطاعات الاقتصاد العالمي. أدى الوباء إلى تباطؤ وعكس مسار التقدم في مجال الصحة ، مما أدى إلى قصر متوسط العمر المتوقع ، لا سيما في البلدان الفقيرة والمتخلفة. من ناحية أخرى ، لعب التعلم الآلي والذكاء الاصطناعي دورًا مهمًا في الاستجابة العالمية للوباء. ونتيجة لذلك ، سعى البحث الحالي إلى تقييم دور الذكاء الاصطناعي والتعلم الآلي في مواجهة التهديدات التي يشكلها جائحة COVID ، وكان للذكاء والتعلم الآلي دور مهم في الاستجابة لقضايا جائحة COVID-19. من بين الإنجازات البارزة الأخرى ، لعب الذكاء الاصطناعي والتعلم الآلي وأدوات الاتصال الرقمية المختلفة من خلال الرعاية الصحية عن بُعد أدوارًا مهمة في توسيع نطاق اتصالات العملاء ، وتوفير منصة لفهم كيفية انتشار COVID 19 ، وتسريع البحث عن COVID-19 وعلاجه. والخلاصة هي أن دور الذكاء الاصطناعي والتعلم الآلي يحفزنا على استنتاج أنه يجب على الحكومات بناء الثقة في هذه التقنيات من أجل معالجة القضايا الصحية المستقبلية وضمان تحقيق أهداف التنمية المستدامة المتعلقة بالصحة الجيدة والرفاهية.

**الكلمات المفتاحية:** الذكاء الاصطناعي، COVID-19، مراقبة المريض، التشخيص

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