The Role of Artificial Intelligence in Tackling Covid-19 (A Review)

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Abstract

This paper investigates how Artificial Intelligence (AI) can be used to combat the Covid 19 epidemic. The article first introduces the benefits of AI and how it has been used to aid people during the pandemic. The history of the Covid-19 pandemic is laid out, and AI technology is introduced. It then examines the responses to the pandemic and its effects on the economy and society. The research uses a qualitative methodology, which entailed looking at original documents and supplementary materials like scholarly articles and books about the subject. The paper used this method to determine how various forms of artificial intelligence could combat Covid 19. Among these were improvements to vaccines and medications and the ability to detect and identify infections, manage their remediation, keep track of individuals' contacts, predict mortality rates, and calculate them. Additionally, the paper explored how AI technology has affected disease prevention efforts and how further study of AI could benefit healthcare. After observing the effectiveness of AI technologies in halting the spread of the Covid 19 pandemic, the authors concluded that more study was required to fully grasp the long-term effects of AI technology in healthcare and its ethical implications.

Keywords: Artificial Intelligence (AI), Covid-19, Machine Learning, Neural Networks, Deep Learning, and pandemic.

1. INTRODUCTION

AI has become one of the fastest-growing technologies worldwide. Technology has been greatly appreciated because of its different advantages. The different impacts obtained from AI have been seen to be good for humankind. The recent developments of the covid 19 pandemic have resulted in different impacts on the world. Most people have gone through different types of suffering because of the pandemic. AI technology showcased many applications in helping people through the pandemic. AI technology was used by organizations such as the World Health Organization (WHO) to analyze the number of people affected by the virus (Geyser, 2021). Henceforth, AI has been a new revolution in information technology. AI has enabled most organizations to have a solution through such a tough time. This research discusses the overall role of AI technology on covid 19 and some of the implications of this technology.

2. BACKGROUND ON ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is a cutting-edge innovation. In most fields, technological advancements are seen as essential. AI is how machines attempt to mimic human intelligence and behavior (Pampliega, 2019). Computer systems have become one of the leading machines to be influenced by AI technology heavily. One of the reasons that have caused this technology to grow and develop greatly is its potential impact on different industries (Tsenkova & Toyoda, 2001). AI is still being researched and learned. Researchers and organizations are learning more about technology to learn more aspects (Wirawan, 2021). This factor has brought the terminology that AI learns more over time (Haddock & O'Keefe, 1990). The idea that AI has the potential to succeed is also one factor that has made the technology greatly endorsed.

AI technology has different applications in different firms. The application of AI technology across different industries has made it very popular. This factor has also made many people learn and research the concepts (ECS, 2018). This aspect makes the concept of AI greatly grow and develop. Technology's main driving force is trying to ensure machines can reason like humans' brains. Over the years, this concept has been closely achieved. This factor can be viewed from the recent advancements and accomplishments in AI.

3. HOW ARTIFICIAL INTELLIGENCE WORKS

Aichner, a communications official in Microsoft Teams, tried to relate machine-learning approaches for noise cancellation with machine-learning methods for speech recognition. Aichner found that a massive corpus of consumers talking into the microphone for voice recognition should be recorded (Ernes et al., 2021). After recording, human beings should be requested to mark the voice information by recording what has been stated. Rather than mapping the microphone input into written words, individuals will attempt to change from noise to clear speech in noise cancellation. With such strategies, Microsoft Teams will train the model to comprehend the variation between speech and noise, and the model will learn to maintain the speech. In developing the training datasets, Microsoft Teams took thousands of dissimilar speakers with more than 100 forms of noise (Kadykalo, 2019). The team then integrated the noiseless clear speech with noise to feign a microphone signal. The training model is then fed with clear speech as the foundation of truth. The team enquires from the training model to abstract a pure signal and its features from noisy data. Therefore, the neural network is trained in supervised learning to identify the basic truth.

According to Hinton et al. (2012), the primary truth is the speech in the microphone when recognizing speech (Pesec, 2020). In real-time cancellation, the primary truth speech should be free from noise. The Microsoft Team can effectively train its model by providing massive data sets for hundreds of hours of data. The model will learn to generalize and minimize noise using a clear speech even if the speech was not part of the training data.

To properly understand the role of AI in the pandemic, one should first understand how AI works. The entire ideology of AI technology is that it tries to make machines reason like human brains. This factor has ensured that most electronic products are included with the technology to receive a large market. AI, in general, is a huge concept mixed with different concepts (Vadinský, 2018). Special products and hardware are always required to ensure that AI successfully runs in a product. AI systems have thus been included in different machines or products to achieve efficiency.

The technology of Artificial intelligence involves very many different factors. The main use of AI technology was invented in analyzing pieces of information (Boden, 1984). As showcased above, AI technology involves the development of systems that can analyze and interpret information similarly to humans. AI technology has been developing in recent years. Many people

must understand what it entails and how it affects different industries. This factor was showcased in a study conducted in 2017, where 17% of 1500 business leaders understood this concept (Ernes et al., 2021). This aspect was showcased as an underlying factor that impacts the development of AI technology.

AI technology combines large amounts of data, fast processing, and intelligent algorithms. This feature allows AI technology to detect patterns in the available data and learn from this data. Therefore, AI technology involves various technologies and methods (Boden, 1984). These methods and theories are included as a subfield of AI technology. Different languages can be used to develop the machine language of machine learning. The theories and methods listed below are some of the subfields of AI technology.

A. *Machine Learning*

Machine learning is a large part of AI technology - it is considered a branch of AI technology and computer science. It involves the automation of analytical model building. Different methods are included in the hidden data insights in neural networks, statistics, and operations research. By interpreting large amounts of data is possible to determine these concepts. Improving the learning concepts like humans ensures more accuracy (Pesec, 2020). Machine learning was first developed in 1962 when a machine learning algorithm was included in the game of checkers. Robert Nealey, a master in this game, was fond of losing to this computer. This aspect was a major milestone in machine learning (Trappl, 2019). One of the fields that have been greatly appreciated is machine learning technology in the field of data science.

The field of data science has appreciated machine learning concepts because it can analyze vast information and detect the patterns available. The accuracy and speed included in the machine learning algorithms are one of the factors that have made this technology to be appreciated greatly (Ryman-Tubb et al., 2019). Data mining projects have also been included in the applications of machine learning algorithms. The demand for machine learning will continue to increase as data increases.

B. *Neural Networks*

Neural Networks are technology-focused on mimicking the way the human brain functions. The technology is concerned with the operations included in the human brain and how it interprets a

vast amount of data. The technology is used in different industries for various applications, such as financial interpretation (Sharma & Dash, 2023). Neural networks in financial industries enable financial forecasting, trading algorithms, and securities classification. The field of finance has developed greatly from neural network technology (Sriram, 1987). A neuron in the neural network is the mathematical function that can classify the available information in a specific architecture. The network relies greatly on statistical methods that are used in the interpretation of the available data.

Similarly to the brain, a neural network involves nodes connected in different layers. Each node in the network is a perception of eh available multiple linear regression. This perception is essential in feeding the signal produced by the multiple linear regression nodes into an activation function. This ideology ensures that the concepts work together to serve the different applications of neural networks. A neural network in the trading algorithms will evaluate the available price data and make trading decisions. Other application areas include market research solutions, risk assessment, and fraud detection.

C. *Deep Learning*

Deep learning is also a key part of artificial intelligence. It is included as a subset of machine learning, helping computers perform human-like tasks. These tasks include speech recognition, image identification, and making a prediction (Chrisley, 2016). This technology has increased the capabilities of machines to classify data. Recognition, detection, and describing are key concepts that have grown with advances in deep learning in machine learning and Artificial intelligence in general.

Deep learning is considered a great part of Artificial intelligence. The key application can be seen in our daily products, such as Siri and Cortana. With deep learning, computers are trained to understand large amounts of data patterns, ensuring we learn from these patterns (Dash et al., 2022). The technology of deep learning has evolved over the years. This technology has included various concepts, all concerned with the evolution of machine understanding (Bohre et al., 2015). Besides its applications, it is one of the most sought deep learning principles in computer vision. The evolution of AI and robots is concerned with computer vision. Through these concepts, deep learning plays a huge part in the overall evolution of AI technology (see Fig 1).
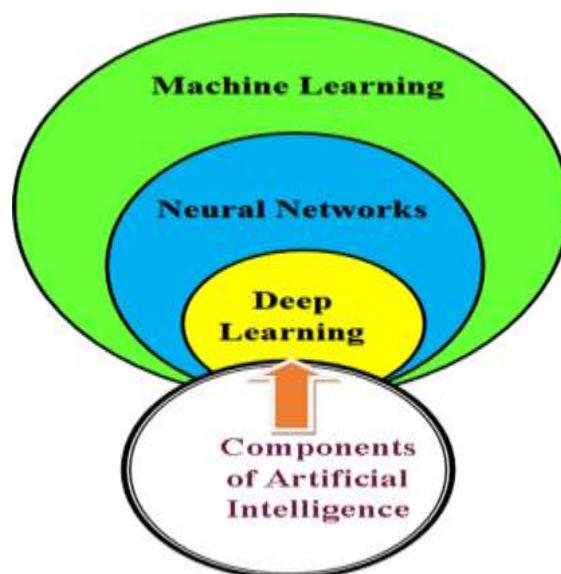
Fig 1. Components of AI

4. BACKGROUND OF COVID 19

Covid 19 affected different operations worldwide, creating a pandemic. The disease is caused by an infectious virus called SARS-CoV-2 (Norlen, 2020). The symptoms of the virus are similar to those of the common cold virus. One of the aspects that made the disease a pandemic was how easily it could be transmitted from one individual to the next [VD, 2020]. The disease impacted most of the normal operations in the world through different mitigation measures, impacting people's lives. Lockdowns and a ban on globalization were painful measures that interfered with the social construct and day-to-day operations.

The virus was first detected in December 2019 in Wuhan, China. The World Health Organization (WHO) concluded that it was a new type of coronavirus. The virus spread very first across the globe, facilitated by globalization. The health impacts of the disease included an infection in the respiratory tract of the affected individuals. This aspect affected most people's lives and sometimes led to death. The spreading of the disease was mainly through contact. Every person may experience unique symptoms relating to respiratory tract infection (Jayasinghe, 2021). The impact of the virus was felt worldwide when governments started including measures to fight the spread of the disease. Overall impacts of the virus were aspects such as how people's lives were changed by the measures placed to fight the spread of the disease. Many countries received many cases and had to impose measures to avoid more spread.

One of the key measures imposed was the ban on international travel (Hassan, 2021). This measure aimed to decrease the rate at which the virus spread across different individuals.

Early research on the spread of the virus showcased that a single individual could affect two to three others (Roloff, 2020). This aspect led to an increase in new cases reported every week. Data collected by WHO found that the spread of the virus was associated with the interactions of different individuals (Bansa, 2020). Reported from the CDC also included a report showing that a person could be infected if they stay within 6 feet of an infected person for a minimum of 15 minutes (Oliveira, 2020). This aspect led to increased measures being implemented to fight the spread of the diseases.

5. MEASURES TO FIGHT AGAINST THE SPREAD OF COVID 19

Different measures were included to fight against the spread of the virus. These measures were placed in most countries to ensure that minimal impact was felt. All the measures placed were made to ensure the virus was tackled. Technological innovations were also included in assisting these measures. One of these key measures was the wearing of face masks. By wearing face masks, it was possible to ensure that people remained safe. Wearing face masks was made mandatory to protect people from contracting the virus. People are still required to continue wearing face masks to remain safe. Facemasks were considered the first key measure to ensure the spread of the virus had been minimized.

The next key measure was the aspect of online schools and working from home. Online learning greatly ensured that the spread of the virus did not impact students. Through online learning, students continued with their studies after the closure of schools. Working from home was also introduced, where people who could work from home were given permission [26]. This attribute included the technology innovations of technologies such as Zoom and Meet. The two technological developments allowed people to communicate through the internet (Chiu, 2020). The two measures above ensured that contact at the workplace and school was minimized.

Another key aspect that was included was the attribute of online shopping. Companies like Amazon, which supported online shopping, greatly developed based on this factor. The technology enabled people to shop online and deliver their products to their doorstep (Opast, 2021). This factor ensured that the transmission of the virus through market products was reduced (Benefit, 2021).

The attribute also ensured that people remained safe. Another measure that was also introduced included the aspect of sanitization throughput. Organizations and companies were required to erect sanitization sections to achieve this factor.

Table 1. Methods used to fight Covid 19 and their impacts

Measures to fight Covid 19	Positive Impacts	Negative Impacts
Washing hands regularly	➢ Reduced transmission and spread of disease	✚ N/A
Social distancing	➢ Reduced transmission of the virus ➢ Reduced risk of infection	✚ Lack of social interaction ✚ Economic impact
Mask wearing	➢ Reduced transmission of the virus ➢ Reduced risk of infection	✚ Inconvenience ✚ Difficulty breathing
Quarantine	➢ Reduced transmission of the virus ➢ Reduced risk of infection	✚ Loss of freedom ✚ Financial hardship
Vaccinations	➢ Reduced transmission of the virus ➢ Reduced risk of infection ➢ Reduced risk of severe illness	✚ Potential side effects ✚ Cost of vaccinations
Sanitizing	➢ Reduced transmission of the virus ➢ Reduced risk of infection ➢ Reduced risk of severe illness	✚ Cost of supplies
Contact tracing	➢ Reduced transmission of the virus ➢ Reduced risk of infection	✚ Privacy concerns
School/Business Closures	➢ Reduced transmission of the virus ➢ Reduced risk of infection	✚ Economic impact ✚ Lack of social interaction

6. METHODOLOGY

Researcher relied on a qualitative methodology to learn how AI can help with Covid 19. The qualitative method was utilized to comprehend the overarching ideas and the influence of AI on the epidemic. Primary and secondary sources were utilized in the research process. Articles and publications relevant to the topic were analyzed as part of the primary research. This research strategy facilitated deeper comprehension of the report's many abstract ideas. Different reports and publications were analyzed to determine their relevance to the topic, which constituted the secondary sources used. This aspect was essential to making sense of the study as a whole.

Additionally, the research focused on studies examining the overall applications of AI technologies in fighting the virus. The applications were included in the health organizations, businesses, research organizations, and organizations impacted by the pandemic (Elhami et al., 2019). The impacts of AI technology on Covid 19 could be divided into different aspects such as diagnosis, treatment, transmission evaluation, etc. Every application of AI was attributed to the fight against the pandemic.

7. AI TECHNOLOGY AND COVID 19

Based on the impacts of the Covid 19 pandemic, various aspects must be included to tackle the above impacts. Tackling Covid 19 and its impacts was essential across different industries (Lapostolle et al., 2021). The innovations in different sectors aimed to reduce the impacts and the total number of cases globally. AI was regarded as one of the aspects that could tackle the virus and its impacts (Chiu, 2020). Below are some of the ways through which AI technology could tackle Covid 19.

D. *Diagnosis and Recognition for the Patient's Infection*

The first major use of AI technology for Covid 19 has been recognizing patient infection. The attribute of visual learning has been key in different health organizations. It is always hard for humans to detect simple and smaller changes. AI technology, on the other hand, can easily recognize such changes. This factor makes AI technology able to recognize symptoms and infections in individuals (Dawson, 2021). Machines used in hospitals have been included with AI algorithms to help with this factor. Visual learning in deep learning and neural networks lay a huge part in the overall impact of AI technologies in the health industry.

AI is said to resolve infrequent symptoms available and other red alarms available. The healthcare management can be notified of an available diagnosis that the AI has made. The attribute is considered because it offers a faster response than human analysis. The response helps in saving costs since it can observe different patients in a short time. This factor ensures that more people are diagnosed, and healthcare management saves money and time. For the Covid 19 virus, the technologies ensure they have learned from previous patients' data (Kommu, 2021). This factor ensures that the symptoms can be analyzed quickly and that a diagnosis is provided through the available algorithms.

AI has also been used to recognize the available infection through MRI, Magnetic Resonance Imaging technology (Park et al., 2020). The technology involves scanning the human body and providing health management with changes resulting from the virus. Understanding these changes will help analyze the other patients to be treated (Voleti, 2020). Diagnosis and Recognition of the Patient's Infection is thus a major impact of AI technology in tackling the Covid 19 virus.

E. *Controlling the Remediation*

Technology also played a huge part in the remediation of the virus. Understanding the virus behavior is a key part of controlling the pandemic. This attribute involves AI technology being able to read huge amounts of data. Technology plays a huge role in predicting the propagation of this pandemic (Voleti, 2020). This factor is obtained from AI technology's ability to build an intelligent framework for auto-controlling and predicting the behavior of the pandemic.

The development of a neural network that could be extracted as seen from the behavior of the virus is one of the underlying factors that ensure the disease can be controlled. This attribute will ensure proper remediation and monitoring of the influenced patients. Patient updates can be given continuously, and the provision of available solutions for these updates. The overall impact of this benefit will ensure that the virus has been mitigated. The attribute of AI technology controlling the remediation of Covid 19 will ensure that patients can maintain themselves without help from others (Wee & Findlay, 2020). This aspect ensures that cost has been saved exponentially through this technology.

F. *Tracing of Contact for The Users*

One of the main factors that are making the virus to be deadly is the rate of spread. Reducing the number of cases being detected daily has been researched to be a key way of mitigating the virus spread. This attribute could be showcased through the prevention of more cases happening. Contact tracing was one of the key ways of preventing the virus from spreading (Leslie, 2020). The aspect of contact tracing involves tracing every individual that had contact with a person. To stop the number of available cases, contact tracing is used to trace every individual that had contact with a certain infected individual. In this way, the individual may be told to isolate themselves from others.

Contact tracing can be easily achieved through AI technologies. Using AI algorithms in contact tracing makes ntire process faster. AI can detect the clusters and contagion of the patients. This data will help the authorities reach these people and ask them to self-isolate. The technology is also ensured by interpreting each patient's vast data (Geyser, 2021). The technology can also trace all the available patients and research the person who contaminated them. This attribute is considered one of the key ways AI technologies could mitigate the increase in new cases. AI technology can also estimate the near course of Covid 19 and the available pre-existence estimation.

G. *Estimation of the Number of Cases and Death-Rate*

Understanding the number of cases was a key requirement in the pandemic. Every country is required to provide the WHO with the number of recorded cases (Naudé, 2020). This factor will ensure that the organization understands which countries require the most help. The attribute also ensures that the vaccines produced can be provided to the hugely affected countries (Dash & Sharma, 2022a). The death rate was also essential in keeping track of the overall impact of the virus. Understanding the number of death rates ensured that the virus's mortality rate could be tracked.

AI played a huge part in showcasing the spread of the disease - AI is essential in tackling the number of cases of infections across different countries. The spread and potential distribution are also aspects calculated with the help of technology (Wright, 2020).

AI is essential in predicting the most affected regions in the coming years and the available nations that require more measures than others (Manzo & Pellino, 2021). The number of cases and death rates were obtained through publicly available data, media networks, and social networking.

H. *Improvement of Vaccines and Drugs*

Drug research is a key essential part of the tackling of Covid 19. Finding the vaccine or cure for the symptoms of the virus was an important part of undertaking the disease. The disease generally affects many lives (Dash & Sharma, 2022b). The more people affected by the virus, the more vaccine research was prioritized. AI technologies have recently been integrated into drug and vaccine research (Bansa, 2020). The technology is used to research more vaccine information, which is then provided to the researchers. By providing more details concerning the virus, it becomes necessary to make drugs and vaccines that work.

The technology has also been found to support the making of the Covid 19 vaccine. The available side effects are analyzed with the help of AI technology. The technology was also greatly utilized in creating and expanding available drug distribution methods. Drug distribution is an important part of the tackling process (Haque & Abdelgawad, 2020). People who greatly need the vaccines must receive them first. Medical tests and vaccines were included throughout Covid 19 mitigation. The technology helped ensure that the improvement of vaccines and drugs was made possible. The technology of machines using AI also ensured that drug manufacturing processes were automated. This aspect ensured that more doses were being produced at a time. This factor showcases that AI technology plays a huge part in tackling Covid 19.

I. *The Disease Prevention*

AI technology played a huge part in trying to save more people from the disease. This aspect was evident from analyzing the vast amount of publicly available data. The governments and organizations analyzed different information and found ways to avoid further disease transmission. The first key disease prevention method was ensured by predicting possible areas of infection-understanding the areas of infection provided necessary data on the influx of the virus (Dash, 2021; Lovetrue, 2020). This data ensured that organizations and governments could understand beds and healthcare staff requirements at given periods (Lovetrue, 2020). AI will analyze the data and prevent such an outbreak based on the information collected during this pandemic.

The different factors will ensure that preventative measures have been placed for future virus outbreaks. Analyzing the data using AI technologies showcases that it is essential to disease prevention. This factor showcases that disease prevention through AI technology is an essential part through which AI technology can tackle Covid 19.

Fig 2. Role of AI for Covid I9 preparedness and response

The image above summarizes some key aspects through which AI tackles Covid 19. It shows the overall process through which AI technology could be used in Covid 19 pandemic, specifically for preparedness and response.

8. RESULTS

According to the findings, AI technologies successfully combat the Covid 19 epidemic. Diagnosis, recognition of infection, remediation management, user contact tracking, case, mortality rate estimation, and enhancement of vaccines and drugs are some areas where artificial intelligence technologies have been used. AI technologies in the fight against disease have also been demonstrated to be crucial. Decision-makers at various institutions have benefited greatly from the information made available by AI technologies deployed to combat Covid 19. As a bonus, technological advancements have reduced expenses and accelerated processes.

The capacity of AI technologies to process large amounts of data has been instrumental in enhancing the efficiency of the healthcare system as a whole. According to the findings, AI tools are crucial in the battle against the Covid 19 pandemic.

9. FUTURE RESEARCH AND RECOMMENDATION

This study gives a full picture of how AI can help us deal with Covid 19. Studies have shown that AI technologies are crucial for accurate diagnosis, contact tracing, and disease prevention. Yet more study is needed in a few key areas. Understanding the long-term effects of AI technology in healthcare is an important area for future research. This research has only focused on the immediate effects of AI on Covid 19 so far. Examining how AI will change the medical field is a crucial future study area. To do so entails researching how AI may affect the healthcare sector, among other things, by examining its impact on other diseases and conditions. The ethical ramifications of using artificial intelligence in medicine is another promising area for future study. The ethical implications of using AI technologies are still being explored, despite the technology's potential to alter the healthcare system radically. The risk of biased judgments, privacy issues, data security, and other related topics will all be investigated. Finally, research into the economic effects of AI on the healthcare sector is essential. Artificial intelligence technologies may help the healthcare sector save money and work more efficiently. The cost-benefit analysis of artificial intelligence (AI) technologies and their potential effects on the healthcare industry should be thoroughly researched.

10. CONCLUSION

The number of applications of AI technology is increasing. The increase in this number of applications showcases that the future will have more influence on AI technologies. Companies should ensure that more research is designated for future AI technologies. AI is regarded as a fourth-revolution technology. This factor means that technology is considered a huge part of the evolution of the globe. The growth of AI technology impacts various industries. This factor means that there is a high possibility that AI will entail 80% of all innovations in the next 30 years. A key recommendation for healthcare organizations is that they should adopt technologies greatly. The report showcases that technologies have a higher chance of tackling pandemics. More research into these perspectives will ensure that virus outbreaks such as Covid 19 can be prevented. Covid 19 pandemic was one of the greatest impacts on the globe.

The pandemic affected a lot of lives and resources. The impacts resulting from the pandemic were devastating across different countries. Different measures were placed to try and tackle the virus.

One of these technologies included AI technology. AI proved to be a huge part through which Covid 19 infection rates could be prevented. The research has identified some of the ways through which AI technology tackled the pandemic. Covid 19 was greatly impacted by the rise of AI. Some of these ways included contact tracing and drug and vaccine production. All of the ways through which AI affected Covid 19 showcase that it could be used to prevent future virus outbreaks. The report also examines the background of AI technology and some of its applications today. The fight against the Corona Virus pandemic is continuing, and more health organizations should include AI technology in this fight. This factor will ensure that more lives are saved through technology.

11. ACKNOWLEDGMENT

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