Perspective

Role Artificial Intelligence Technologies Played Combating COVID19 Pandemic

Anikesh Kumar[1], and Gopal Krishna Sharma*[2]

[1] Undergraduate Student, Bachelor of Computer Application, Sanskriti Vishwavidyalaya, Haridwar, India
[2] Department of Computer Science, Dev Sanskriti Vishwavidyalaya, Haridwar, India
*Corresponding author email: gopal.sharma@dsvv.ac.in
https://doi.org/10.36018/dsiij.v16i.164

Abstract. Artificial Intelligence (AI) is one of the most useful technologies during COVID19 pandemic. In this current situation, AI played a vital role in various and different sector from an infected patient to the economy-wide. A wide range of examples are available for how AI tackled with COVID19 and is helping during the pandemic around the world. During this pandemic time, large to small companies have been developing new AI approaches such as droids, machine, software and gadgets in embracing fight against COVID19 pandemic. The present study reviews application of AI and how it has supported in this pandemic.

Keywords. COVID19, Pandemic, Artificial Intelligence (AI), Technologies

ISSN: 2279-0578 (PRINT); 2582-4589 (ONLINE)
PUBLISHED BY DEV SANSKRITI VISHWAVIDYALAYA, HARIDWAR, INDIA

Introduction

Corona Virus family causes illness which includes respiratory and gastrointestinal diseases. Respiratory illness ranges from the common cold to more severe diseases such as severe acute respiratory syndrome (SARS-CoV). COVID19 is a recently identified coronavirus strain that has been identified in humans recently. It has caused a global pandemic in the first half of the year 2020. The structure of the virus contains an envelope containing protein. The coronavirus envelops protein, which morphologically appears like a spike (crown). The crown in Latin means Corona. Thus, the name of coronavirus strain is originated (1-2).

The newly emerged COVID19 pandemic in which so far it is known that the virus causes respiratory diseases and it may spread through large respiratory droplets and direct or indirect contact with the infected object. Also, COVID19 virus duration of incubation in a human before the appearance of any symptom is predicted from 2 to 14 days (1-2). About 8,993,659 confirm cases, 469,587 deaths and 152,325 new cases recorded till 24th June 2020 globally as per World Health Organization, while in India, 152,325 confirmed cases, 14,011 deaths, and 14,933 new cases were recorded for till the same date (3).

The pandemic has lead to the situation like great depression globally affecting social life and all economic sectors including sporting, religious activity, political activities, business, cultural events, widespread supply shortage, global supply chain, education, and so on. All efforts of the human civilization are combined to fight against the scenario including the technology sector. Artificial Intelligence (AI) has also played an important role and contributed to the fight against the COVID19. The present study aimed to present the contribution of AI sector in the fight against the pandemic.

The emergence of new work-environment to avoid infection is a challenge for finding novel technological solutions

All health systems, modern and traditional, globally are challenged for the high demand for care of COVID19 infected people, while also maintaining the health service for regular diseases. Hospitals are over-flooded with patients. There is a continuous need for a constant supply of food, essentials, medicines, maintenance services, which also needed care of avoiding human contacts to reduce the change of COVID19 infection. The new work environment in hospitals, emergency services providing sectors and eventually in all the working sectors has been emerging with social distancing approaches, screening direct-non-direct contacts, sanitization, delivery methods, working space reorganization, etc.

The scenario certainly raised the need for an alternative solution, where one can be safe while working. All work demanded social distancing. For example, doctors are distantly sensing the temperature of patients, along with other technologies to access and treat the patient; e-commerce companies are trying new approaches in the delivery of products from host to customers; education industry also adopted online mode of teaching.

These approaches needed high-end technical revolutions to provide the feeling of new normal, indicating a high expectation from AI to play an important role in this global crisis of COVID19 pandemic. During the COVID19 span, AI has been proved a very important and trending technology, not only with CS developer and with scientists, but also with the pharmaceutical developers, agriculture-related researches, space technology, and others. It has been used at a huge level for combating with COVID19 pandemic; wide range of applications and AI technologies by multiple companies were used for different purposes, which are reviewed as following.

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Use of Artificial Intelligence by different countries government for population management during COVID19 pandemic

Country	Contribution of Artificial Intelligence
India	Used a lot of robot and drones for food supply, medicine delivery like Prithivi, ASTRA; used software programs and AI-enabled sensors population management; apps for communication (4).
Singapore	Used compiled data measured by mobile phone and geo-location, random home checking of people for managing population and gathering for social distancing (4)
China	Used for mass surveillance, also smart devices were used to screen temperature to identify COVID19 infection; used 'smart' helmets capable of flagging individuals with high body temperature; used facial recognition devices used for detecting wearing of masks (4)
Israel	Used for alerting the people for social distancing, wearing masks and for tracking geo-locations (5).
South Korea	Used for social distancing especially at crowded places such as public transport, shopping centre through collecting information and providing to controllers (5).
Taiwan	Government provided mobile phone to infected patients and traced the geo-location for providing information to the police to track their movements, social distancing and hygiene (4).
Italy	Used a specifically developed smart-phone application to trace the travelled history of a person infected with the virus and for warning people who got contact with the patient (6).
Lombardy	Used application to find travelled places of infected patient (6)
United state	In collaboration with IT companies, US Government collected aggregated and anonymous data especially on mobile phones to prevent the spread of the virus (4)

Application of Artificial Intelligence by various companies during COVID19 pandemic

Name of Company	Role of AI and working areas
Deargen	In February, Scientists of Deargen published a preprint paper at South Korea with the results from a deep learning-based model called MT-DTI. In this model they used chemical sequences, rather than 2D or 3D molecular structures, to predict how a molecule of interest would bind to a target protein (7).
Insilico Medicine	Hong Kong-based Insilico Medicine purposed paper in which, the team used an AI-based drug discovery platform to generate tens of thousands of novel molecules potentially binding a specific SARS-CoV-2 protein and block the virus's capacity to change them (8).
SRI Biosciences and Iktos	On March 4, in Paris with the collaboration with Menlo Park-based research center SRI International and AI company Iktos, discovered and developed new anti-viral therapies (7).
Giant Baidu	In collaboration and partnership with Chinese technology giant Baidu, Oregon State University and the University of Rochester, published Linear fold prediction algorithm in February 2020 to study the same protein folding. This algorithm proved much faster than traditional algorithms in predicting the structure of a virus' secondary ribonucleic acid (RNA) and provided scientists with additional information on how viruses spread (7).
IBM, Amazon, Google and Microsoft	Partnered with White House for providing computing resources for COVID19 research; the members of the consortium are the White House, the Department of Energy and IBM. Other companies, including Google, Amazon and Microsoft, as well as many academic institutions were also contributing (8).
DeepMind (Google)	A subsidiary branch of Google's parent company is Deep Mind and Alphabet, also shared its predictions of coronavirus protein structures with its AlphaFold AI system (9).
BlueDot	BlueDot is a Canadian company that credited with the fast detection of the virus using an AI and test over 100 data sets from news, airline ticket sales, demographics, climate data and animal populations (7).
Infervision	It is a Beijing-based start-up, this company trained its software using computed tomography (CT) scans for detecting lung problems; the software could also detect pneumonia-related with respiratory diseases such as coronavirus (7).
Alibaba	The Chinese company Alibaba also trained an AI system for recognizing the coronaviruses with an accuracy claimed to be 96%. The system was said to have helped at least 26 Chinese hospitals and review more than 30,000 cases (8).
Shenzhen company	Shenzhen company MicroMultiCopter deployed more than 100 drones to many Chinese cities that could patrol areas and observe crowds and traffic more efficiently (7); the biotech company Seegene used it to develop the test kit and distribute it widely (7).
Jvion	Jvion is using machine learning algorithms to determine the social risk factors that make people more likely to contract and spread the virus or acquire an infection that requires hospitalization. Jvion's AI would help identify uninfected individuals out in the community who are at risk for a severe course of illness (7).
EndoAngel Medical Technology	A separate AI developed by researchers from Renmin Hospital of Wuhan University, Wuhan EndoAngel Medical Technology Company, and

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Company	the China University of Geosciences purportedly showed 95-per cent accuracy on detecting COVID19 in chest CT scans. This system is trained on 45,000 anonymized CT scans using a deep learning algorithm (7).
Nanox	The Israel-based Medtech company, Nanox, has developed a mobile digital X-ray system that used AI cloud-based software to diagnose infections and help prevent epidemic outbreaks (7).
Facebook	Facebook is already working with researchers at Harvard University's School of Public Health and the National Tsing Hua University, in Taiwan, sharing anonymized data about people's movements and high-resolution population density maps, which help them forecast the spread of the virus (8).
Google	Google said its team was working round the clock to safeguard our users from phishing, conspiracy theories, malware and misinformation; search for COVID19 brings an SOS Alert appears, alongside links to help and information about the virus (8).
Benevolent AI	In February, British AI-startup Benevolent AI published two articles. The Lancet and second in The Lancet Infectious Diseases, that identify drugs that might block the viral replication process of SARS-CoV-2 (7)

AI based Robot used globally during COVID19 pandemic

Name of Robots	Services
Prithvi	Delhi students invented a robot that helped workers & COVID19 patients for reducing their contact. Prithvi can deliver food and medicines to patients (10).
UBTECH Robotics' ATRIS, AIMBOT, and Cruzr	Deployed at Shenzhen hospital special for during treatment of COVID19 patient. These Robot providing videoconferencing services between patients and doctors, monitoring the body temperatures of visitors and patients, and disinfecting designated areas (10).
HEBI Robotics	This robot helped in social distancing by controlling a robot arm in Austria from their lab in Pittsburgh (11).
SLIDER	A robot at Imperial College London served as a sliding human for many purposes like medicine delivery and other (12)
Robot 'Zafi' in Chennai	This robot delivered the food and medicines to patients at Chennai hospital and preventing doctors and medical staff from getting infected with the coronavirus (13).
ASTRA	A robot that could move and used powerful Ultraviolet C (UVC) to annihilate bacteria and viruses, including coronavirus (10).
ASIMOV	This Robot launch as a KARMI-Bot. This
ROBOTICS	Robot could disinfect hospitals using UV rays and carry food and medical supplements to patients in isolation wards (14).
UVD Robots	This robot also used for disinfection of room and wards using ultraviolet-light and product of Danish manufacture (12).
BeamPro	This robot used in Alexandra Hospital in Singapore forsee and surveillance of isolated patients suspected of being infected with the new coronavirus (11).

Conclusion

Artificial Intelligence technologies proved a powerful technology during this COVID19 pandemic. All types of sectors used AI and supported the fight against COVID19 directly and indirectly. Now, usage of Artificial Technology is not limited at education and research institutes but it had been implied vigorously in various fields ranging from an individual to multinational companies and even by Government bodies of many countries to fight COVID19 pandemic.

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