Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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The artificial intelligence (AI) role for tackling against COVID-19 pandemic

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ABSTRACT

COVID-19 gains from the research and technology component's establishment of information science, artificial intelligence, and computer understanding. The article aims to discuss the numerous facets of today's modern technology utilized to combat COVID-19 emergencies on various scales, such as medicinal picture handling, illness tracking, expected outcomes, computational science, and medications. Techniques: A complex search of the knowledge base associated with existing COVID-19 innovation is conducted. Furthermore, a concise survey of the excluded data is conducted, analyzing the various aspects of current developments for dealing with the COVID-19 pandemic. The below are the outcomes: We have a window of musings on the audit of the tech propellers used to mitigate and mask the significant impact of the upheaval.

Even though several investigations into current innovation in COVID-19 have surfaced, there are still required implementations and contributions of innovation in this war. Consequently, a thorough presentation of the available data is given, and several modern technology implementations for combating the pandemic of COVID-19. Continuous advancements of advanced technologies have aided in improving the public's lives, and there is a strong belief that proven study plans utilizing AI would be of great benefit in assisting people in combating this infection.

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1. Introduction

The initial Coronavirus Infection report in December 2019 (COVID-19) in China, specifically in Wuhan city, impacted more than two hundred countries and regions across the globe with 2,000,000 instances and reached 120 thousand passings as of 21/04/2020 [1]. Depending on this expanding emergency, organizations and experts worldwide are observing for the methods to solve the issues of this virus, alleviate the spreading, and sets up treatment for this pandemic [1].

Science and engineering are playing a critical role in this great war. For example, when China first responded to the outbreak, it relied on AI by relying on facial recognition cameras to track infected patients with activity histories, robots to deliver food and drugs. Automatons sanitize open spots and watch and transmit sound signals to open, encouraging them to stay at home [2].

To provide support for COVID-19, artificial intelligence was already extensively used to find new particles when in motion. Many scientists utilize AI to find new drugs and medicines for remediation, with specific software engineers focusing on identifying the irresistible patients by clinical image preparation such as X-beams and CT examinations [3].

In either case, artificial intelligence is similar to watching wristbands that assist in ordering people classes bending the isolation law. PDAs and AI-enhanced warm cameras are being used to differentiate between those with fever and others that were injured [4]. Countries such as Taiwan have infused their national medical care database with details from immigration and customs, exposing coronavirus patients depending on their travel histories and symptoms [5,6]. Overall, AI is utilized to detect, monitor, and predict outbreaks and aid in virus diagnosis. It is used in the processing of medical claims. Drones and robotics are used to distribute food and drugs, as well as to disinfect public spaces. Utilizing supercomputers, AI is assisting in the creation of medicines and a coronavirus vaccine [7].

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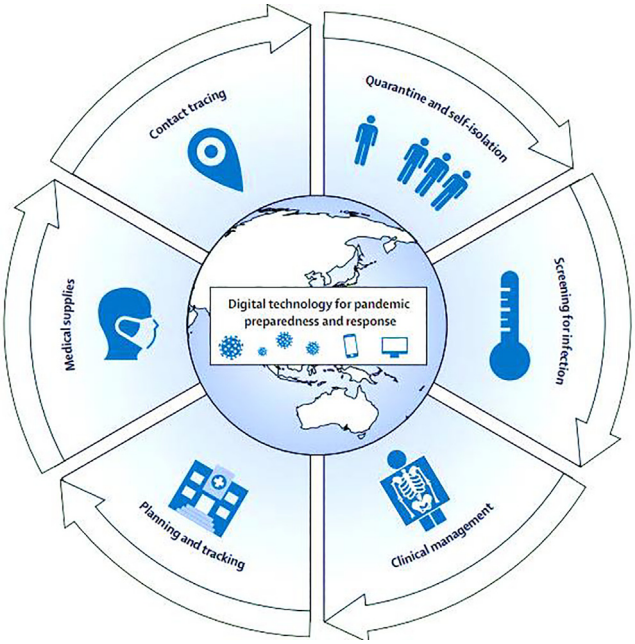

Fig. 1. Pandemic preparedness and reaction utilizing digital technology [20].

The current research focuses on the utilizing of AI developments in the war against the Coronavirus outbreak. It goes through many of the technological advancements used to lessen and smother the outburst's significant effect. This review aims to determine the effectiveness of the procedures described and recommend how they can be used. This paper demonstrates AI applications and provides an overview of how new technology might respond to the COVID-19 pandemic [1].

2. Major AI applications in the COVID-19 pandemic

The meaning of technology includes strategies, systems, and techniques resulting from scientific information being obtained for remediation purposes. AI can be divided into Natural Language Processing (NLP), Machine Learning (ML), and Computerized Vision devices. These capacities command computers to use extensive data depending on models to implement, analyze, and decide [1].

In the following points, we illustrate some methods where AI is generally used against coronavirus [1–5].

2.1. Make early diagnosis and recognition for the patient's infection

Artificial Intelligence can resolve infrequent symptoms speedily and other red alarms, giving an alarm to the healthcare management and patients [4,5]. It gives a faster response to make a decision, which offers a lower cost. It develops a good management and diagnosis system for the coronavirus condition by utilizing fast and good algorithms. AI helps to discover the causes that infected with the disease by utilizing other imaging techniques like a Magnetic resonance imaging (MRI) scanner for body parts of humans and Computed tomography (CT).

2.2. Controlling the remediation

AI can build an intelligent framework for auto-controlling and can predict the propagation of this pandemic. The development of a neural network could also be extracted the seen characteristics of this virus, giving proper remediation and monitoring of the influenced patients [6–8]. It can give continuous patient updates and give solutions to be dependent on the pandemic of COVID-19.

2.3. Tracing of contact for the users

AI could analyze the value of contagion by this pandemic, knowing the clusters and tracing contact for the patients, and controlling them. AI can estimate the near course of this virus and its likely preexistence.

2.4. Estimation of the number of cases and death-rate

This technology can identify and forecast the presence of the virus, and the possibilities of spread and potential distribution, using social networking, publicly available data, and media networks. It could also predict how many positive cases and accidents would occur in a specific region. AI would aid in identifying the most affected regions, peoples, and nations, allowing for effective measures to be taken.

2.5. Improvement of vaccines and drugs

AI is utilized for drug research by analyzing the existing data on COVID-19. It may be utilized to create and expand drug distribution processes. This technique is utilized to speed up substance recognition in real-time, whereby traditional research takes a long time and enables a vastly accelerated process that would be impractical for a human to complete [6,7]. It could help in the development of new drugs to treat COVID-19 sick people. It was evolved into a valuable method for developing medical tests and vaccines [9–11]. AI aids in developing drugs and medications at a far higher pace t and clinical testing throughout vaccine development.

2.6. Decreasing the workload on the workers in healthcare

Following the pandemic of COVID-19, healthcare staff became overworked due to a dramatic and unexpected increase in sick people. Artificial intelligence (AI) has been utilized to assist healthcare workers in reducing their workload [12–17]. It helps in early detection and treatment using digital tools and judgment research and providing doctors and students with the most up-to-date information on this emerging illness. [18,19]. AI can change future health remediation and solve further potential problems, reducing physicians' workload.

2.7. The disease prevention

Using real-time data collection, AI can provide new information that is helpful in the prevention of this disease. It may be used to predict the possible areas of infection, the virus's influx, and the requirement for beds and healthcare staff during the epidemic [20]. AI will aid in the prevention of possible virus and illness outbreaks by using mentored data from the past rather than data collected at different periods. It describes the characteristics, sources, and explanations for infection transmission. This technology would be critical in the fight against other pandemics and epidemics in the future. It may be utilized to treat a host of illnesses as a preventative measure and treatment. In the future, AI will have a vital function in providing more preventive and predictive healthcare [20]. See (Fig. 1 and Fig. 2) [20].

We identified multiple implementations of recent technology for coronavirus plague in Table 1. To combat COVID-19, AI focuses primarily on the virus and patient identification, medical imaging processes, disease monitoring, and prognosis. On the other hand, it includes internet-based alerting, awareness, and social monitoring. See (Table 2.).

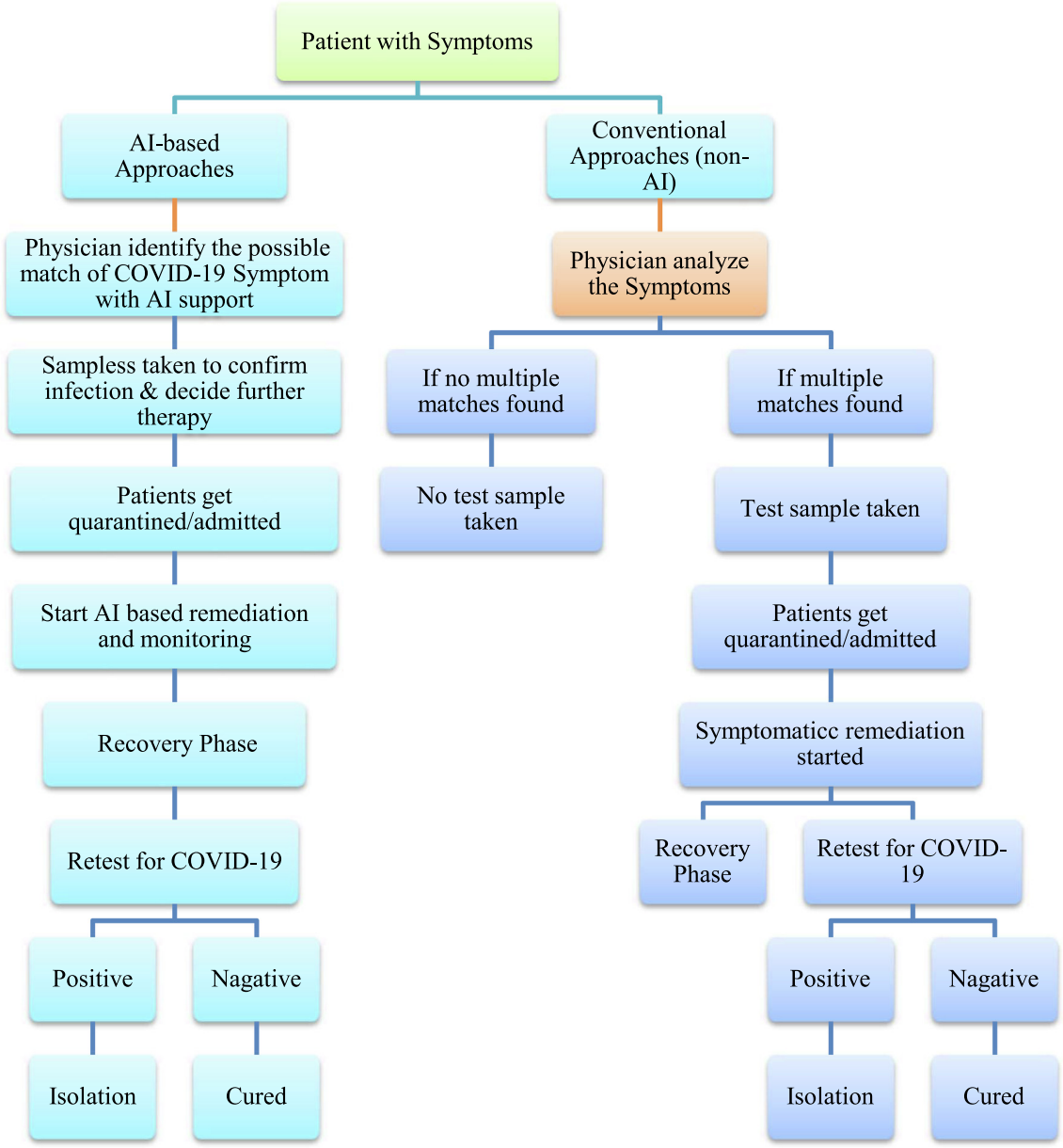

Fig. 2. Overall procedure for non-AI and AI-related software that assist general practitioners in detecting COVID-19 symptoms.

Table 1
Different implementations of recent technologies for conflict COVID-19 pandemic.

System	Functions	Digital technology	Benefits	Drawbacks
Tracking	Real-time monitoring of illness occurrence	Real-time data from a technology of wearable and smartphones; dashboards of data; maps of migration; machine learning	Enables for a visual representation of the spread; directs boundary limitations; directs the allocation of resources; and advises forecasts	It might jeopardize privacy, comes at a high cost, require management and control.
Infection Screening	Populations and Individuals are screened for the illness.	Temperature sensors, smartphone apps, infrared cameras, and web-based toolkits are all examples of AI.	Recognizes patients for research, touch tracing, and isolation, providing details on illness incidence and pathology.	May infringe on people's privacy; struggles to diagnose asymptomatic people based on self-reported indications or vital sign monitoring; entails high costs; necessitates management and regulation;

(*continued on next page*)

Table 1 (*continued*)

System	Functions	Digital technology	Benefits	Drawbacks
Contact tracing	Persons who may have come into touch with an infectious individual are identified and tracked.	The technology of wearable; the systems of global positioning; smartphones applications; real-time tracking of mobile phone devices	Recognizes and quarantines all that have been exposed to the virus; monitors viral transmission.	If the app is disabled, the mobile device is missing, or Wi-Fi or cell access is insufficient, it could violate privacy; it may identify people that have not been exposed but have had contact; it may struggle to identify persons who are exposed if the app is disabled, the mobile phone is missing, or Wi-Fi or cell connectivity is inadequate.
Quarantine and self-isolation	Recognizes and monitors sick people, as well as putting them under quarantine.	Smartphone apps; AI; cameras and digital camcorders; the systems of global positioning;	Isolates infections; travel of restricts	Civil liberties are violated; food and vital supplies can be restricted, and persons who leave quarantine without detectors are not detected.
Clinical management	Diagnoses sick people and keeps track of their health.	ML; virtual treatment or telemedicine platforms; AI for diagnostics.	Aids in clinical decision-making, diagnostic tools, and risk prediction; allows for more effective service delivery;	Might jeopardize medical privacy; struggles to evaluate patients properly; comes at a great expense; machinery could break down.

Table 2
Uses of modern technique throughout pandemic of COVID-19.

References	Description	Uses	No
[5,21–23]	[5] AI is utilized to obtain radiological characteristics in order to provide prompt and reliable results. Diagnosis of COVID-19 By the number of pictures, early identification of COVID-19 instances using different CNN models may be checked. COVID-19 identification instances from X-rays and CT pictures, COVID-Net, a CNN Based design, may be utilized. COVID-19 identification neural network (COVNet) distinguishes COVID-19 from community-acquired pneumonia and other lung problems. Besides early COVID-19 Case identification, 3D deep learning models may be utilized.	Diagnosis utilizing radiology images	1
[24]	[24] respiratory habits that are abnormal The classifier could help with large-scale COVID-19 infection screening. The infected individuals are estimated using a time-dependent SIR model. A GRU neural network with mechanisms of bidirectional and attentional (BI-AT-GRU) was created to classify respiratory trends. The SEIR (Susceptible, Removed, Infectious, and Recovered or Exposed) model predicts the outbreak's course.	Disease tracking	2
[25,26]	[25,26] The supervised XGBoost classifier makes a simple and intuitive clinical test possible to accurately and efficiently measure the probability of death. The viability and precision of ML-based CT radiomics models for predicting stay in hospital in COVID-19 sick people are illustrated.	Forecast outcome of patient's health condition	3
[27–29]	[27] Benevolent AI was utilized to look for baricitinib, a drug that is expected to reduce the virus's capacity to infect lung cells. RFID and Hybrid Algorithms.	Computational Biology and Medicines perspective	4
[11–13]	[11] Using deep neural networks, the Critical Evaluation of Approaches for Protein Structure Forecast (CASP) predicts protein properties from the genetic sequence. For dense forecasting, convolution architectures networks are detected. The residual learning system can be utilized to prepare even deeper image recognition networks even more accessible.	Protein structure forecasts	5
[14,15]	[14,15] To create innovative drug composites, an AI-based drug development pipeline has been integrated. To disassociate the style and quantity of files, unsupervised grouping, visualization techniques, and dimension decrease, adversarial autoencoders have been utilized.	Drug discovery	6

3. Conclusion

Investigators are considering all options for fighting the coronavirus pandemic, and technological advances have been proved to be an intriguing choice. Although technological advancements have brought countless successes into our daily lives, they have also aided citizens in the very difficult fight against COVID-19. The articles discuss the difficulties that arise as these algorithms are used in real-world clinical settings. Similarly, there is enthusiasm for potential studies on evolving a benchmark method to evaluate and compare obtainable strategies. Present models provide a high degree of accuracy in identifying COVID-19 signs of different cases of viral pneumonia using radiology photographs. However, they are unclear and difficult to understand. It can be inferred that there is a wide variety of emerging technology applications that could be used to address the therapeutic and cultural problems faced by the pandemic of coronavirus; nevertheless, only a handful of them have been adequately implemented to illustrate operational efficacy.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Further Reading

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