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ARTIFICIAL INTELLIGENCE IN THE FIGHT AGAINST COVID-19

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Abstract

Background: COVID-19 erupted in Wuhan, China, in December 2019, causing national and foreign disruptions in health care, business, education, transportation, and virtually every part of our everyday lives.

Objective: The paper will study, explain, and summarise the characteristics of the established AI techniques and data sets used for their creation and validation.

Methods: I examined the most used electronic databases (for eg, MEDLINE, EMBASE, and PsycInfo). These words were chosen depending on the intended action.(i.e., AI) and the disease of interest (ie, COVID-19).

Results: AI was also employed in drug and vaccine research, forecast the spread of COVID-19, measuring the magnitude of COVID-19.assessing the severity of COVID-19, predictingmortality risk.

Conclusion: The included studies demonstrated that AI has the ability to combat COVID-19.

Keywords: *artificial intelligence; mortality risk; electronic databases;*

INTRODUCTION

Background

COVID-19 broke out in Wuhan, Hubei Province, China in December 2019, spreading across the world and killing over 330,000 people as of May 2020.COVID-19, which was caused by SARS-CoV-2, was considered a global pandemic.The World Health Organization had declared a pandemic in March 2020.Many people infected with COVID-19 developed fever.Some patients had cough and nausea, while others had a dry cough.Some experienced a serious course of the medical condition, necessitating intensive care, including hospitalisation and mechanicalventilation. COVID-19 and its contagiousnessan enormous number of cases all over the world have resultedglobal and international disturbances in industry, health care, and education, transportation, and almost every other part of our everyday lives.To mitigate the impacts of this pandemic, prompt and successful countermeasures are required; robust public health policies including monitoring, diagnostics, and clinical trials are required.Care and study are needed.

Using digital platforms and software to tackle COVID-19 will supplement public health interventions, such as using chatbots to answer public questions about COVID-19.Furthermore, public health practitioners may use interactive resources tomonitor the occurrence of COVID-19 infections in real time, model their projection if possible. Artificial intelligence (AI) is one such tool—a field of computer science concerned with intelligently processing and managing complex knowledge. —intensifying public health campaigns to combat COVID-19.Despite the excitement for AI applications since the 1950s, only a few have been created.Because of the availability of AI, there has recently been a surge in interestof high-performance computer processingas well as massive quantities of data being produced every second.

AI allows computers to become intellectual, comprehend questions, sift through and bind mountains of data points, and draw actionable conclusions Thus, specifying the taxonomyAI is not a simple task; its approaches can be classified depending on the aim is to learn from experience, investigate, and discover. Draw conclusions from knowledge, and reason from knowledge. Several nations, research institutes, and technology industries issued calls to action immediately after the COVID-19 pandemic broke out throughout the world, asking researchers to take action and create AI solutions to combat the disease. Help with COVID-19-related investigations. From a hierarchical standpoint,AI will help COVID-19 at many levels: molecular (e.g., medication and vaccine discovery), patient (e.g., patient diagnosis), and global population-level surveillance (for example, epidemiological surveillance).

Research Problem

AI can analyse large data sets by aggregating and sifting through mountains of health care data (including patient data) to produce insights that can allow predictive analyticsexamination. The opportunity to gain these inputs quickly enables physicians and other partners in the health care community to make efficient, secure, and prompt decisions to better serve patients as well as public health policy. There has been a consistent increasein the number of reports on the use of AI techniquesto fix or overcome the COVID-19 pandemic.During the COVID-19 pandemic, much of the AI development activity was dispersed, and there was a need to investigate and summaries how AI worked. Technologies are being used to tackle or fix the many issues.COVID-19 challenges will help us plan how to proceed. Make use of AI technology in the event of a present or potential pandemic.Several reports on AI strategies used to combat the COVID-19 pandemic have been published.The majority of the work, however, has taken the form of literature reviews or systematic evaluations focused on a particular application. A.I. (for example, COVID-19 diagnosis and prognosis). As a result, a more complete and comprehensive inquiry is required Experimental.

Search Sources

I conducted searches on the following online databases between April 10 and 12, 2020: MEDLINE (through Ovid), EMBASE (via Ovid), PsycInfo (via Ovid), IEEE Xplore, ACM Digital Library, arXiv, medRxiv, bioRxiv, Scopus, and Google Scholar. In the case of Google Scholar, and owing to the amount of returned hits, I only evaluated the first 100 results, since I discovered that results beyond this point soon lose relevance and application. Inaddition to scanning bibliographic databases, I checked the reference lists of the included studies and pertinent reviews for other relevant studies that might be included in this review (backward reference list screening).

Study Eligibility Criteria

I focused on any AI-based tool or method utilised for any purpose connected to the COVID-19 pandemic, including as diagnosis, epidemiological forecasts, and outbreak response, Treatment and vaccine development, as well as patient prediction outcomes. I did, however, omit papers that provided an overview, or by presenting a viable AI method for COVID-19, or by doing researchthings were solely considered from a scientific standpoint I looked at peer-reviewed papers, theses, dissertations, conference proceedings, and preprints published in English between December 25, 2019, and April 12, 2020, while omitting reviews, conference abstracts, proposals, editorials, and comments. I imposed no limitations on the country of publication, research design, comparator, or results.

Data Synthesis

I utilised a narrative method to synthesise the data after extracting it from the selected studies. I classified and described the AI techniques used in the included studies in terms of their purposes (e.g., diagnosis and drug and vaccine development), AI area or branch (e.g., traditional AI models and algorithms (for example, decision tree, random forest, and naive Bayes), as well as platform (ie, computer and mobile).Furthermore, I described the data sets used for AI model development and validation in terms of data sources (e.g., public databases and clinical settings); data type (e.g., radiology images, biological data, and laboratory data); and data type (e.g., radiology images, biological data, and laboratory data); size of the data collection, the kind of validation, and the proportion of training, validation, and test data sets are all important considerations. To handle data synthesis, I utilised Microsoft Excel (Microsoft Corporation).

RESULTS

Search Results

By searching the indicated bibliographic databases, I was able to locate 435 studies (Figure 1). I eliminated 53 duplicate studies before screening the titles and abstracts of the remaining 382 papers. For reasons stated in Figure 1, the screening process resulted in the removal of 234 research. I eliminated 73 papers after reviewing the complete texts of the remaining 148 studies because they did not fulfil all qualifying requirements. As a result, the remaining 75 studies were included. By reviewing the reference lists of the included studies and related literature reviews, I discovered 7 more research. This review comprised 82 papers in total.

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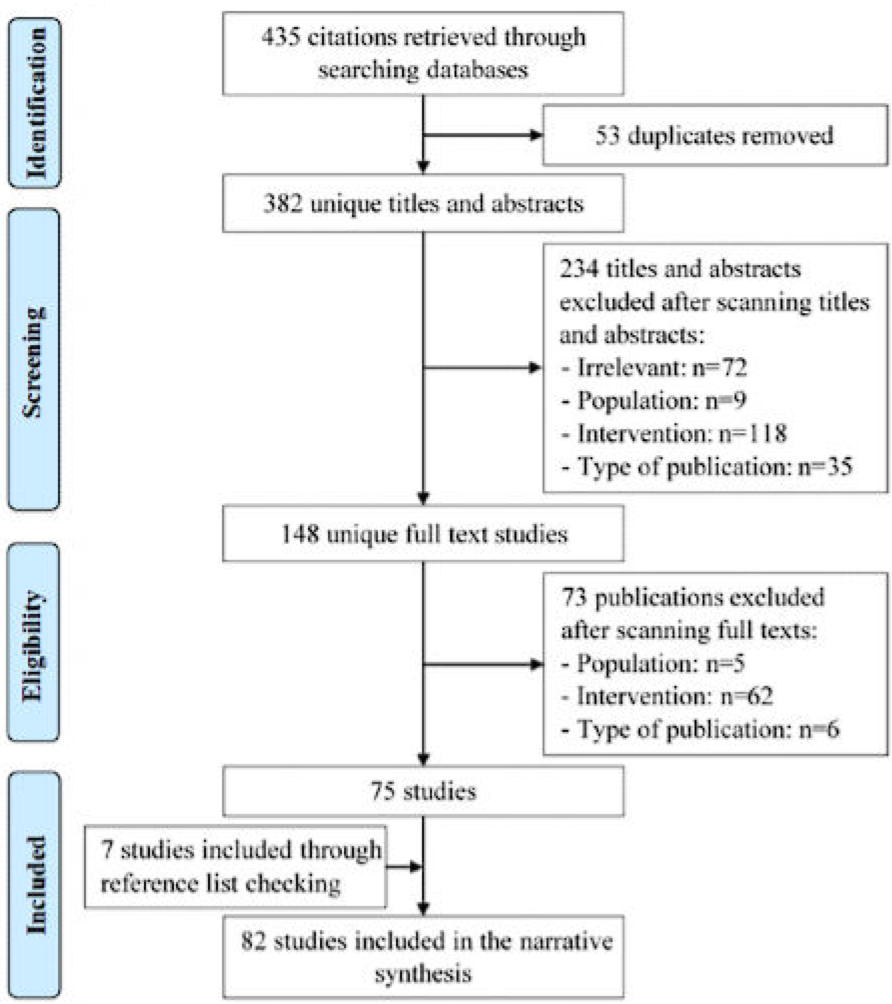

Figure 1. Flowchart of the study selection process

AI-Based Techniques Used for COVID-19

Purposes or uses of AI Against COVID-19

During the epidemic, AI methods have been employed for five purposes. AI was utilised in 31 studies to diagnose COVID-19 cases or detect probable COVID-19 cases using different markers such as computed tomography (CT) pictures, x-ray images, laboratory tests, genomic sequences, and breathing patterns.AI was used in 20 trials to develop treatments and vaccines for COVID-19. In particular, 9 research utilised AI to find medicines that might be used to fight COVID-19, while 2 studies used AI to repurpose currently available pharmaceuticals that could be used to treat COVID-19. There was one research that used artificial intelligence to estimate the safety of utilising traditional Chinese medicine for COVID-19. AI was used to identify COVID-19 vaccines in four trials. Another four studies utilised AI to anticipate the microstructure of SARS-CoV-2, aiding researchers and pharmaceutical firms in the discovery of COVID-19 medicines.

AI was utilised in 17 research to do epidemiological modelling tasks. In specifically, 14 of this research deployed Intelligence to anticipate epidemic development (e.g., numbers of confirmed, recovered, death, suspected, asymptomatic, and critical cases, as well as durations and ending times), while three studies used AI to predict epidemic development.

AI was employed for patient outcome–related tasks in 14 research. Six research, in particular, employed AI for segmentation and quantification of COVID-19-infected areas in the lungs, allowing the severity of the illness to be assessed. AI was also employed in four trials to identify patients that were at high risk of progressing to severe COVID-19.Furthermore, AI was utilised to predict mortality risk, related variables, and length of hospital stay in COVID-19 patients.

AI has also been applied to epidemiology. Specifically, AI was utilised to raise awareness about the need of water, sanitation, and hygiene by integrating authentic sources of information with daily headlines.

DISSCUSSIONS

I did a scoping assessment of the application of AI against COVID-19 in this work. In December 2019 and January 2020, I discovered a dearth of publications. This is not surprising given that SARS-CoV-2 was only discovered on January 7; insufficient data was available to support scientific publications, particularly those published internationally; and the virus's contagiousness and aggressiveness were underestimated (the first lockdown in China occurred on January 23). Half of the research included in this study were first published in China. Because SARS-CoV-2 originated in China and was the most prevalent during the first three months of the epidemic, it had the most data on COVID-19.Given the duration of the publishing process and the large number of COVID-19–related article submissions, it is not unexpected that the majority of the included research were preprints.

AI was utilised for five goals in the included studies: diagnostic, therapy and vaccine development, epidemiological modelling, patient outcome–related activities, and infodemiology. None of the research featured employed AI for additional objectives, such as tracing people' contacts, teaching students and health care workers, or using robots to deal with suspected and quarantined cases.

The majority of the AI techniques utilised in the included research were deep learning approaches like CNN and RNN. Except for one research, all were conducted on desktop computers, workstations, and clusters rather than mobile platforms. The computational requirement in training AIs can explain this.Although all major smartphone manufacturers have AI coprocessors in their top models, these coprocessors only speed up inference, which is a computationally far lighter operation. Furthermore, federated learning (a machine learning privacy-preserving approach commonly employed in mobile phones) is still in its early stages, raising concerns about data sovereignty, scalability, and performance.

Conclusions

I present a scoping review of 82 AI research against COVID-19 in this paper. Given that many of the recommended approaches are not currently clinically approved, I believe that the most fruitful research will focus on strategies that have potential usefulness beyond

COVID-19. I feel that mobile phones have untapped potential, but further study towards energy-effectiveness of no pharmaceutical treatments is a relatively untapped research area, especially given the data driving this study is publicly available, unlike most of the data produced by clinical studies. Standardized reporting standards for AI investigations are required for AI to acquire widespread adoption. Similarly, additional study on AI ethics and explainable AI is required, as well as public education campaigns.

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