

Role of Artificial Intelligence in fighting against COVID -19

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Abstract— In today's world, AI has been contributed in variety of ways in our daily lives with numerous successful stories. Even during the outbreak of the corona virus disease (COVID-19) pandemic, AI has played a vital role in fighting against it. In this paper, we have represented a survey of AI applications that has been used in order to fight against the corona virus pandemic. From Internet of Things (IoT), text mining, medical image processing, biology and medicine, data analytics, AI has always played the important role. Motivated by the modern technology and Artificial Intelligence applications in wide areas, this paper mainly focus on importance of controlling the spread of COVID-19 pandemic and finding the solutions to prevent the severe effects of this corona virus disease. By using the methods of deep learning and artificial intelligence, a number of domains like agriculture, medical, electronics, retail, healthcare, etc. has achieved better results and benefits. This paper firstly represents the literature review and then the various applications of AI in fighting against the COVID-19. It is expected that this paper provides the organization and researchers with new insights in how helpful the AI has been to improve the situation of COVID-19 and in further stopping the spread of COVID-19 outbreak.

Keywords—*Corona virus disease, machine learning, Artificial Intelligence, medical image processing, RT-PCR, computer audition*

I. INTRODUCTION

The novel corona virus disease (COVID-19) has generated enormous disorganization worldwide, affecting the lives of wide range of people and causing a thousands of deaths in a day and also affects people living in penury situations, older persons, persons with disabilities, youth, and aboriginal peoples. In China there is turn down in COVID-19. In Europe, the cases are increasing every day than there were in China at the epidemic's peak and as the country Italy has surpassed with the most number of deaths from the virus. It took 67 days to reach the first 100,000 confirmed cases worldwide. The count of corona virus cases has been extended more than manifold to 17.5 million, and the number of deaths has more than tripled, to 680,000, based on statistics of the World Health Organization (WHO) till 3rd August [1].

AI is being used for preparing treatment plans, analyzing transmission rates, analyzing medical data, drug development, contact tracing, and detecting hotspots. Specialists believe in the technological landscape and even in other fields, the impact of Artificial Intelligence will be significant. This paper mainly focuses on the vital roles of AI methods in the fight against the COVID 19 pandemic.

We provide a comprehensive survey of AI applications/methods that support humans to suppress and

reduce the substantial impacts of the pandemic, as Natural Language Processing (NLP), Machine Learning (ML) and Deep Learning. In order to defeat this challenging battle, we belief that the proper research of AI will fully support in helping humans against this pandemic. An overview of AI can, for present purposes, be defined and computer vision applications to teach computers to use big data-based models for analysis, prediction, explanations and pattern recognition [3].

In this paper section II provides the literature survey, section III highlights the application of AI fighting against COVID-19 and section IV gives the conclusion.

II. LITERATURE SURVEY

The COVID-19 has generated enormous disorganization worldwide, affecting the lives of wide number of people and causing a thousands of deaths in a day and also affects people living in penury situations, older persons, persons with disabilities, youth, and aboriginal peoples.

Science and technology have donated significant implementations during this unpredicted and chaotic time. For analysis and research the artificial intelligence has been the prime tools being currently used [4]. The AI technology has the potential to improve the treatment, reported outcomes and planning of the COVID-19 patient, being an evidence-based medical tool. It is understandable that healthcare systems have been overwhelmed lately. In order to help and alleviate some of the burden from call centers, many organizations, including the WHO and CDC, are adding virtual healthcare assistants or "chatbots" to their websites. These assistants can answer questions, provide informative updates, check for symptoms, and advise where to go for screening or home-isolation. The AI language processing features can potentially reduce urgent care visits significantly, as well as reducing anxiety by providing factual, up-to-date information on the virus [3]. Thus it is a need of an hour to research on the significance of AI to fight against the challenging battle and also in helping humans against this pandemic

In today's world, AI has been contributed in variety of ways in our daily lives with numerous successful stories. Even during the outbreak of the corona virus disease (COVID-19) pandemic, AI has played a vital role in fighting against it. In this paper, we have represented a survey of AI applications that has been used in order to fight against the corona virus pandemic. From Internet of Things (IoT), text mining, medical image processing, biology and medicine, data analytics, AI has always played the important role. We have also presented the data sources related to the summary of COVID-19 that are available for research purposes. We have thoroughly discussed about the exploring potentials and

enhancing capabilities of Artificial Intelligence and power in the battles against the pandemic in research directions. We have point out the problems related to the COVID-19 outbreak and the suitable AI applications and tools which can be used to solve the problems. It is expected that this paper provides the organization and researchers with new insights in how helpful the AI has been to improve the situation of COVID-19 and in further stopping the spread of COVID-19 outbreak. [3].

The very first infected novel coronavirus case (COVID-19) was found in the city of China, named Hubei in December. 2019. The corona virus case has been spread over worldwide covering 215 countries and has enormously affected the lives of every individual [14]. As the authors mentioned in this paper [2], the number of cases and deaths were still turning up significantly with no sign of well-controlled situations like as of April 2020, there was total 1,853,265 infected cases and total 118,854 deaths cases of corona virus which were reported in the world. Motivated by the modern technology and Artificial Intelligence applications in wide areas, this paper mainly focus on the importance of controlling the spread of COVID-19 pandemic and finding the solutions to prevent the severe effects of this corona virus disease. The authors represents a review on AI and big data, then highlights the different applications of AI and big data and then overview of the challenges and the issues faced and finally come up with the possible solution and recommendation to effectively control the COVID-19 pandemic. It is expected that this paper provides researchers that how the AI and big data has been used in order to improve the condition of the pandemic situation and also derives the solution for controlling the situation.[2].

The instant spread of corona virus disease around the world has left the drug developers with limited amount of time to identify the drugs candidates to fight the virus. Not only in this situation but in other case like making drug discovery faster and cost-effective, artificial intelligence has always proven its value. Despite showing signs of stagnation until fairly recently, drug discovery has gained a new superpower in the recent times. It has not been bitten by a radioactive spider, struck by lightning, or doused in cosmic rays but it has benefited with a new upgrade to the super suite of tools which is artificial intelligence. Using techniques such as machine learning or deep learning, the drug development process can be speed up artificial intelligence using either from existing drugs or brand new compounds. Using technology and science like deep learning or big data, AI can help to accelerate the development process of drugs by identifying therapeutic candidates, either from developed drugs or newly branded compounds. As artificial intelligence has been used for the drugs discovery by number of companies for several years, but still the field of AI is still rather young. The first European drug candidate identified using AI only entered clinical trials earlier this year. AI has been in the shine from the moment, the largest global pandemic, Spanish flu sweeps the world. This field has also been used by the players in Europe to identify potential treatments for Covid-19 faster than ever before [8]. In this paper, we have presented a survey based on the

applications of artificial intelligence to fight against the battle of COVID-19 pandemic.

III. APPLICATIONS OF AI IN FIGHTING AGAINST COVID-19

This section presents the different applications of AI in fighting against the Covid-19 pandemic.

A. Detection of and recovery from COVID-19

Even when no one was aware of the situation that has been created by the COVID-19 outbreak, our data scientist with the help of artificial intelligence system has discovered the pneumonia or not known type of disease in the country of China [9]. As the disease has now become the worldwide issue, the science and technology are using different artificial intelligence methods/tools that can be used to give the support and effort to the medical community, analyzing to manage every situation of the pandemic by preventing, detecting, recovery, response and to accelerate research which is shown in the Fig. 1 [9]. As AI has successfully detected the biological underpinning of various diseases such as cancer, to predict the treatment, similarly in COVID 19, if they find anyone or few of these models, they would have provided with treatment algorithms and guidelines for the patients of COVID-19.

B. Diagnosis and prevention of the spread of corona virus

Diagnosis and prevention of disease has been a center of attention of artificial intelligence from the time when Stanford has developed MYCIN for diagnosing blood-borne bacterial infections.[15]. These methods were not much used for the medical practice even though it showed the accurate treatment and diagnosing of the disease. As they were imperfectly desegregated with medical record system and medical workflows, so they were not significantly superior to human diagnosticians. Early prediction and treatment is important to find the solutions to overcome the COVID-19 outbreak. The reverse transcription polymerase chain reaction (RT-PCR) detection technique is recently being, the accurate method for distinguishing respiratory viruses. In order to response the situation of COVID-19 effort has been made to improve the technology [16] and other alternatives [17]. Due to this reason, we are using AI applications in order to help to diagnose and prevent the spread of corona virus disease. To detect and predict the spread of COVID-19, algorithms that help us to identify the patterns and anomalies are already working, while medical diagnosis has been speeding up using image recognition systems [9]. Using smart devices together with AI frameworks is one of the simplest and the cost-effective solution for the identification of COVID-19 [18], [19]. This is called as mHealth or mobile health presented in [20]. These works are benefited as smart devices are daily used for multi-purposes.

Many preprints on COVID-19 related to artificial techniques for medical image processing has been recently appeared plays an another directive for corona viruses disease [21]-[30].

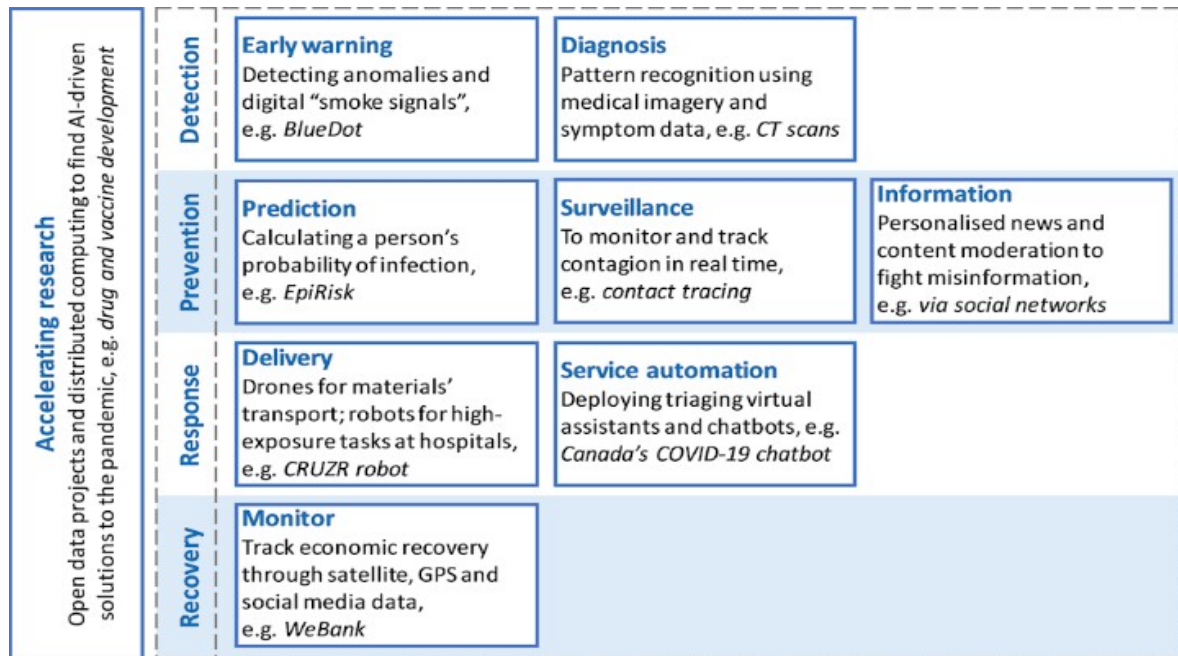


Fig 1. Examples of AI applications at different stages of the COVID-19 crisis

As we have limit our article to the COVID-19 and AI applications, the interested researchers are welcomed to read the surveys in [31], [32], for other applications related to deep learning in medical image analysis. By these works we can figure out to automatically detect the infected corona virus cases, we can use computed tomography (CT) scans and X-ray images as the input of DL models. The authors in [33] tries to design a model for the detection of corona virus cases known as deep convolutional neural network (CNN) model, as motivated by an important finding that infected corona virus patients normally reveal abnormalities in chest radiography images.

Semi-autonomous robots and drones are being used by the hospitals as an intermediate for medications and delivering food, sterilization and cleaning, aiding nurses and doctors, and performing equipment deliveries[9].

C. Healthcare Personnel

Artificial intelligence-based COVID-19 diagnostic software has been developed by the two Chinese companies for their part. Computed tomography (CT) scans has been used to detect lungs problem by the trained software of the Beijing-based start-up Infervision. This software is not only used to diagnose the lung problem but also diagnose the issues related to respiratory diseases such as corona virus. This technology have been used by at least 35 Chinese hospitals for helping them to screen 32,000 suspected cases [11].

Artificial intelligence system has been trained by the Alibaba DAMO Academy, the research arm of the Chinese company Alibaba, to detect COVID-19 with an accuracy claimed to be 96%. The 300 to 400 scans needed to diagnose a corona virus that usually take an experienced doctor about 10 to 15 minutes can be done by the systems in 20 to 30 seconds, as claimed by the company. This system has been

said to be helpful to review more than 30,000 cases in at least 26 Chinese hospitals [12] .

In South Korea, the testing of virus which took normally 2 to 3 months now takes only few weeks as AI is reported to have helped reduce the time needed to design testing kits based on the genetic make-up of the virus. The biotech company Seegene used its automated test development system to develop the test kit and distribute it widely. Comprehensive testing is indeed important to control the spread of pandemic and also to overcome containment measures in this country, which has equipped 118 medical establishments with this device and tested more than 230,000 people [13].

D. Infodemiology and Infoveillance

In today’s scenario, the most authentic information about the COVID- 19 pandemic can be easily found through the authorized sites and the health organizations channels like the World Health Organization (WHO), and also through the ministry of welfare and health in each country. However, social media sites like Facebook, Youtube and Instagram and electronic medium have also showed their value in spreading valuable facts related to corona virus disease. Further analysis has been performed to collect and process data properly as the information provided by the electronic media platform and the online platform is highly attainable and time-consuming .In order to improve the corona virus situation, the social network dynamics can be utilized by AI for better understanding, as AI being the powerful tool to deal with a vast amount of data .To demonstrate the methods of artificial intelligence during the corona virus situation, the work in[5] presented some realistic examples: 1) using the twitter and whatsapp data for tracking the behavior of the public, 2) from the Ebola outbreak, examining the health-seeking behavior, and 3) reaction of the public towards the outbreak of Chikungunya. Similar to the above outbreak,

several studies has been performed from the infodemiology and infoveillance perspectives for the recent emergence of corona virus. In response to the COVID-19 pandemic, the authors in [6] have analyzed the collected data from the two popular social media platforms like Baidu search engine and Sina Weibo by accessing and tracking the public behaviors in this situation. Word Count (LIWC) and Linguistic Inquiry, the text analysis program have been used to evaluate the public emotions whereas public awareness and attention, and disinformation are gained by establishing a Weibo daily index, i.e., the number of posts with keywords related to the corona virus. During the COVID-19 outbreak, the protective measures have been recommended by the Ali daily indices and Baidu by evaluating the behavior and intentions of the public. These outcomes show that rapidly grouping rumors and disinformation can highly reduce the influence of unreasonable behavior. AI tools like computer audition (CA), which is, sound and speech analysis with AI, has contributed to the corona virus situation, were reviewed in [7]. For further analysis, it is possible to collect the audio from social medias, news and also from advertising videos, similar to textual conversion. Several possible instances are also presented, including monitoring the social distancing and spread effects, risk assessment, examining the recovery and treatment, diagnosis, prompting of sound and speech. There are some challenges needed to be addressed in the fight against COVID-19, along the potentials of computer audition(CA), for example, how to process the speech and audio data credibly and in synchronal, how to collect corona virus patient data, and how to explain the outcomes obtained from the CA-based solutions [2].

E. Image scan analysis and reducing hospital staff workloads

Testing has become a crucial and important in the fight against COVID-19. Virus has been successfully handled in the countries like Germany and South Korea, because of the amount of testing that is done in those countries. The main testing methods are time consuming and labour intensive although the health authorities are willing to increase the number of testing being done. Other forms of testing, such as x-ray scanning is been assisted by the AI methods. Lung anomaly in a chest X-ray scan can be done by chest screening using various AI programs and provide a corona virus evaluation of risk much quicker than human radiologists [10].

IV. CONCLUSION

The COVID-19 outbreak has significantly affected the lives of wide range of people and causing a thousands of deaths in a day. While AI technologies have not only beneficial into our everyday life with many triumph, they have also been considerably helping humans in the tough situation to fight against the battle of COVID-19 outbreak. This paper has represented a brief study of AI applications so far in the literature to fight against the COVID19 pandemic and also the controlling strategies. Firstly, we have given a brief introduction of COVID-19 and artificial intelligence and then the applications used to fight against it. AI has been used to understand the virus and discover the novel drug compound against it. The results are in initial position and are also in great demand for AI research in the fields e.g. to investigate chemistry and genetics of the corona virus and suggesting the ways to rapid production in the treatment and vaccine drugs.

AI can help our scientist to fully understand about the virus with its high computational power which will be able to demonstrate with huge amount of data.

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