

Artificial intelligence for COVID-19: A Short Article

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ABSTRACT— *The COVID-19 virus, which began at the end of 2019 in China and spread rapidly and turned into a significant epidemic worldwide, has posed a severe threat to public health. Affected persons may develop an asymptomatic or mild illness or may experience severe consequences, up to acute respiratory failure requiring the support of healthcare workers. In this article, the authors decided to highlight artificial intelligence techniques by identifying the most influential platforms and applications that have been used to track and control the spread of the COVID-19 pandemic. Fifteen tools utilised in the United States, Canada, South Korea, China, Turkey, Iraq, Germany, India, and Netherlands are organised in one table. This article found the significance of artificial intelligence and its ability to combat and control epidemics.*

Keywords— COVID-19, Artificial intelligence, China, pandemic, Machine learning, Coronavirus disease

1. INTRODUCTION

At the end of 2019 in China, a severe pandemic appeared that affected the whole world in a short period, named the COVID-19 pandemic [1-3], which is considered one of the deadly viruses that killed millions of people on Earth [4][5], and it continues to grow in its genes without ending. In 2022 and until the end of March, the pandemic had less influence on citizens due to governments' commitment to the instructions set by the World Health Organisation (WHO) and pushing citizens to take vaccine doses [6][7]. For people who have fought many pandemics throughout history, such as the black plague [8], the Spanish flu [9], and now the COVID-19 pandemic [10], they have the ability and experience to confront any pandemic and prevent its spread, as COVID-19 forced nations to be more ready to avoid the emergence of such an epidemic and prepare to control it.

Today, technology and artificial intelligence techniques play an active and influential role in helping humans follow the spread of the pandemic and study its behaviour in spreading and controlling and manufacturing vaccines [11][12]. In addition, machine learning and deep learning techniques helped healthcare workers analyse patient data and determine the incidence of infection [13][14]. Actually, COVID-19 is a candidate to be mentioned as one of the most significant periods that humans have experienced throughout the ages and has killed more than 6,000,000 people (March 2022 from Google). Moreover, this pandemic is able to change the behaviour of nations through social, political, economic, technological and other life [15][16]. Some governments are prepared for such an epidemic, for instance, South Korea, which was able to control the spread of the pandemic because it went through a crisis in the time of SARS and MERS [17]. However, some governments were not ready, as they faced many situations and obstacles in controlling it, such as Iraq.

In general, the epidemic destroys the lives of citizens, livelihoods, people's well-being and fear of the future. Yet, despite technological effects, electronic devices, and medical sciences, predicting any new pandemic is still impossible. Still, the world must be constantly prepared to face any pandemic that may appear in the future. COVID-19 is recognised as a pandemic by the World Health Organization in March 2020 [18][19]. Since that time, the world has witnessed a tremendous development of the virus with new variants that have a greater ability to transmit and escape from immunity in the body and control the respiratory system of humans despite the presence of different effective vaccines that are being administered applied in different countries. Many symptoms that indicate infection with COVID-19, including high temperatures, headaches [20][21], cough, etc., as well as pain and redness in the eyes, appeared when a study was conducted in clinics in Turkey about seven sick people (under the age of 50) who entered on 17-21.04.2020, who had complaints and pain in the eye as a result of infection with COVID-19, as shown in Figure 1 [22]. The main purpose of this article is to provide an overview of the COVID-19 pandemic.



Figure 1: People with COVID-19 have pain and redness in the eyes.

2. THE ROLE OF ARTIFICIAL INTELLIGENCE IN TACKLING COVID-19

Artificial intelligence techniques have contributed significantly and effectively to the fight against COVID-19 since the first period of the declaration of a pandemic by the World Health Organization [23-25]. Artificial intelligence [26][27] is described as the ability of machines to apply human functions through training on data and computational predictions based on pattern recognition [28-31]. The most essential parts are machine learning [32][33], deep learning [34], natural language processing [35], computer vision [36], etc. Moreover, Artificial intelligence assists in developing and integrating information technology in the medical domain [37-39]. Besides, artificial intelligence techniques can be utilised to accelerate the development of vaccines that assist protect human lives from viruses and establish measures to prevent and control them [40][41]. Artificial intelligence has the ability to make more rapid diagnoses while mixing robots into decision-making [42][43]. In 2020, after the terrifying and robust spread of the COVID-19 pandemic, artificial intelligence was employed to identify and analyse the ways the virus spreads where tools and mathematical models have been created that help healthcare workers in predicting the number of infected people and their symptoms, which can be used in future diseases and to preserve human lives. The science of artificial intelligence is of significant importance because it helps diagnose and provide predictions with perfect accuracy and tools that contribute to helping physicians and healthcare professionals analyse patient data [44-46]. Therefore, it is vital to employ artificial intelligence techniques for their potential to enhance patient care, discover cases and interpret images by computer, as well as diagnose issues by capturing and identifying abnormalities in a specific part of the human body [47][48]. Machine learning techniques are utilised to analyse chest x-rays and computed tomography scans (CT-scan) and determine where the virus has spread in the infected person's lungs. In diagnosing COVID-19, the sensitivity of chest x-rays (see Figure 2) is less sensitive than CT-scan [49][50]. The virus may be normal or less effective in the early stage of the respiratory system. Studies have proven that chest x-rays are more helpful in diagnosing and following up on patients' cases [51][52]. In other words, artificial intelligence can analyse irregular symptoms, monitor patients' conditions, and distinguish between people with viral pneumonia [53] and those with COVID-19. Artificial intelligence enables faster decision-making by diagnosing concerning cases with the help of computed tomography, magnetic resonance imaging, and others. Today, the presence of techniques is essential for healthcare workers by providing the time needed to discover more infected people. In addition, artificial intelligence can be utilised to create an extensive neural network to extract the visual features of a disease, creating an intelligent platform that automatically monitors the spread of the virus. Therefore, adequate monitoring of affected individuals will be beneficial in keeping the outbreak under control. This article collected fifteen artificial intelligence-based applications and platforms that can be leveraged for early virus detection, diagnosis, prediction, and control. These platforms and tools depend on their work on machine learning and deep learning algorithms (see Table 1).

From Table 1, it is clear that artificial intelligence techniques have an impact in controlling deadly diseases, and countries are now supporting these applications to control the epidemic. Artificial intelligence is the hope that significantly helps in diagnosing cases of COVID-19 patients through programs and applications that support give effects in a shorter time. In short, artificial intelligence is utilised in designing computational models to predict and detect positive cases, as well as in managing medical resources and interpreting images; It also enables personalised attention to patients, and in the same way, significant advances are exhibited in vaccine development. In 2022, governments and

health organisations will contribute significantly to vaccinating citizens with COVID-19 vaccines and following up and monitoring patients until they are controlled.

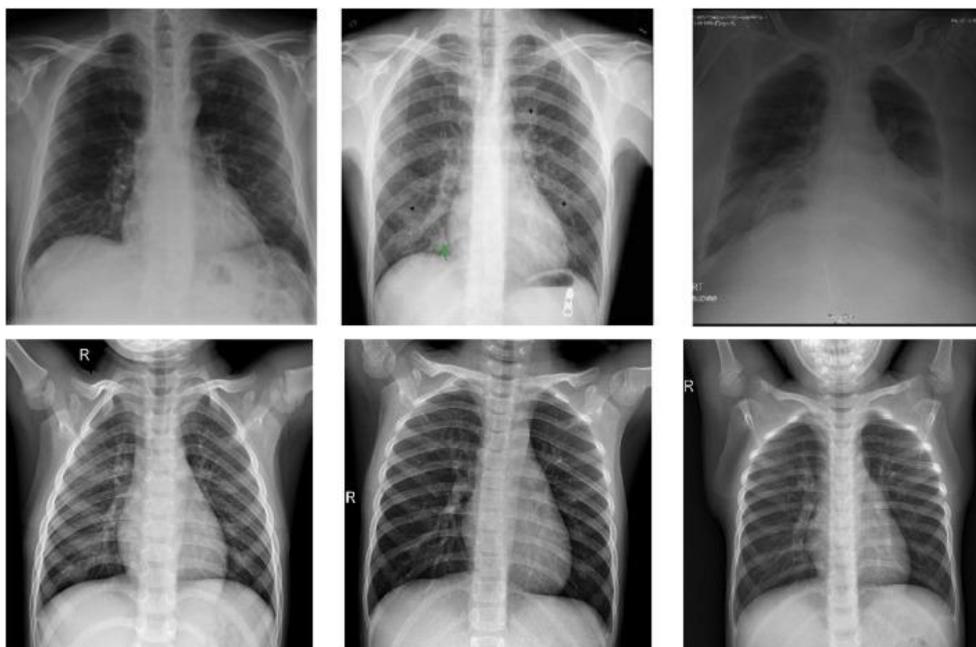


Figure 2: COVID-19 X-ray images [51].

Table 1: Artificial intelligence tools utilised to fight the COVID-19 pandemic

Platforms & Applications	Narrative	Nation
<u>X-ray</u>	Diagnosing COVID-19 using X-ray images	Iraq
<u>ProMED</u>	Monitor disease outbreaks	USA
<u>NextStrain</u>	Monitoring the genetic development of COVID-19	Germany
<u>Microsoft Bing's AI Tracker</u>	Monitor disease outbreaks	USA
<u>JHU CSSE</u>	Monitor disease outbreaks	USA
<u>HES Code</u>	Monitor disease outbreaks	Turkey
<u>HealthMap</u>	Monitor disease outbreaks	USA
<u>Flytnow</u>	Use of drones to observe public spaces	India
<u>DETECT</u>	Track COVID-19 symptoms through wearable devices	USA
<u>DeepMind</u>	Prediction of COVID-19 protein structures	Google/ US
<u>DEARGEN</u>	Analysing the molecular structures of medications utilised to treat COVID-19 patients	South Korea
<u>Camio</u>	Using cameras to detect compliance with social distancing to prevent the spread of COVID-19	USA
<u>CAD4COVID</u>	Diagnosing COVID-19 using X-ray images	Netherlands
<u>BlueDot</u>	Monitor the outbreak and spread of diseases	Canada
<u>Alipay Application</u>	Tracking individuals through mobile application to prevent the spread of COVID-19	China

3. CONCLUSIONS

Artificial intelligence is the science that is being used to reduce the increasing workload of healthcare workers due to its ability to diagnose and track cases, no matter how strong the spread of the virus. This science provides opportunities to train in a multidisciplinary approach to healthcare professionals and assist them in making decisions. In addition, it can be applied to solve potential crises by estimating the need for hospital occupancy and the number of health care workers by surveying areas of heavy infection. It is expected that artificial intelligence techniques will become essential tools in the future to combat epidemics and will also enable the implementation of policies that preserve economic and social harm and support health care. In the end, more studies will be conducted on the application of artificial intelligence in the fight against coronavirus.

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