

# Orchestrating Artificial Intelligence in Exit Strategies from Lockdowns

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## ABSTRACT

The novel human coronavirus is highly contagious and can lead to significant morbidity and mortality. This has triggered major and cascading economic and societal consequences that have contributed considerably to global impact and suffering. It is obvious that there is no immediate solution and one has to learn to live with the virus until either herd immunity has been achieved or a vaccine has been found. As countries exit lockdowns and economies try to revive themselves, it is important to practice social distancing, use masks, avoid fomites and adopt safe practices. Artificial intelligence-based technologies hold the key to success as we emerge back to work and try to revive economies. At the same time, one must also acknowledge its downsides. This article reviews the various artificial intelligence technologies employed as part of exit strategies from lockdowns.

**Keywords:** Artificial intelligence, COVID-19, Exiting from lockdowns, AI-assisted technology in lockdowns, Facial recognition, Thermal screening

## I. INTRODUCTION

The COVID-19 outbreak was described as a pandemic by the World Health Organization on March 11, 2020 [1]. At the time of submitting this article for publication, the total number of coronavirus cases in the world are 74,81,299 with 32,65,890 active infections, 4,19,481 deaths and 37,98,125 recovered cases [2]. India has 2,87,679 infected cases with 1,38,069 active infections, and 8,115 deaths, while 1,41,119 cases have recovered [3].

While countries such as Germany, France, Italy and Spain are past the peak incidence of coronavirus, India's COVID-19 graph depicts a rising curve due to an increasing number of new cases as well as the deaths from COVID-19 [3,4]. Lockdowns are useful

in flattening the curve, and allow governments time to build resources and prepare hospitals for the worst; however, they can also lead to economic devastation in low- and lower-middle-income nations with a large number of daily wage migrant laborers [5,6].

As lockdowns across the world begin to open up, offices will open to reboot operations in a phased manner, and countries will hope for economic revival. In the midst of people learning to live with the coronavirus until either herd immunity develops or a vaccine is found, there is a possibility of another wave of infections coming up. This is where artificial intelligence (AI) has a role to play.

## II. METHODS AND MATERIAL

The authors reviewed the literature pertaining to this subject using Google Scholar, PubMed, Scopus and Google Search. The search terms used include keywords *AI in lockdown opening, usefulness of AI after opening of lockdown, COVID-19 exit strategy using AI, AI and offices in lockdown opening, facial recognition, thermal screening*, and combinations of the above. This search revealed a paucity of publications in peer-reviewed journals on this topic.

## III. APPLICATIONS OF ARTIFICIAL INTELLIGENCE

As COVID-19 reshapes the global economy, technology is at the forefront of the solutions that people have looked towards. Among the several technologies being looked at to shape the COVID-19 response and the post-COVID-19 world, artificial intelligence shows great promise.

### A. Social distancing

Landing AI, a startup headquartered in Palo Alto, USA, has developed a social distancing detection tool that analyzes video content obtained from cameras to ensure that employees are adhering to social distancing norms [7]. This software, which can be incorporated into security camera systems, identifies people who are not maintaining adequate distance from one another, and sends out an alert [8]. Closer to home, Staqu Technologies, an AI startup located in Gurugram, has launched JARVIS – an AI-powered solution that uses video analytics to check social distancing. It makes sure that people are following the appropriate social distancing measures to reduce their chances of contracting the virus [7,9].

### B. Disinfection and Sterilization

It is important to disinfect offices and their surrounding spaces regularly, and AI-driven Bots have huge roles to play here in the sanitization process. Aziobot is a robotics startup based in the

Netherlands that makes cleaning robots for places such as warehouses and retail stores [7,10]. Hospitals can use robots, such as those developed by Danish-based company UVD Robots, to reduce the spread of infectious diseases by harmful microorganisms like bacteria by attacking the DNA-structure of the microorganisms [7,11]. In India, Kerala's Nightingale-19 Robot [7,12] can clean hospitals as well as workplaces, and can sterilize objects that have been used repeatedly.

### C. Thermal screening

Numerous workplaces have included temperature screening as part of their standard procedures to identify employees with fever. The contactless scanning of body temperature has been introduced in the offices of local as well as multinational companies [7]. US-based Flir's thermal camera systems are easy to deploy and are being utilized to spot heightened body temperatures and detect suspect COVID-19 patients [7,13]. The aforementioned JARVIS can be combined with a thermal infrared camera to detect if the temperature of somebody on the premises crosses regular human body temperature [7,9].

### D. Work optimization

Companies that will resume work could have a number of employees in different cities and in various parts of the world. Some of them would need to work from home, while others would need to report to the office. Some people would also need to work in shifts. AI-based software could help schedule employee timings and duties efficiently. Globus.ai, a Norwegian data science and artificial intelligence company, has built an AI-enabled system that automatically fills in the shifts for people in the appropriate time slots. Using natural language processing and machine learning, it can match the nature of the work of the employees to assign them with shifts and responsibilities, while also factoring in company and government policy requirements [7,14].

### **E. Contactless systems**

In the pre-COVID-19 era, biometric attendance at corporations was the norm. Earlier, fingerprint readers were commonly used by all employees. These devices will now have to be jettisoned in favor of a system that will not require human touch, thus reducing the risk of contracting COVID-19 from an infected person. Hence, smartphone-based contactless attendance systems are likely to be the standard at the workplace [15,16].

Touchless elevator control panels are also a novel way to prevent the contraction of coronavirus through touching buttons that can be accessed by a multitude of people. To use the control panel, a passenger can put their finger close to the suitable button on the panel and wait for the button to change color. The user will then be able to either summon the elevator or move to the desired floor once the user is in the elevator [17]. QR code readers can also be used via a smartphone for contactless elevator usage [18]. QR code-based access control can be done using smartphones. It is a safe and easy approach to use, with low maintenance cost [19]. These systems will ensure secure workplace entry and exit.

### **F. Facial recognition technology**

As the entire population of India now wears masks, it has become difficult for people to unlock their phone using facial recognition and to mark their office attendance with a mask on. Hence, software companies are using artificial intelligence with 3D modelling and machine learning-based systems, which would make accurate predictions even when a person is using a mask [20].

Facial recognition could also be useful in monitoring people who are quarantined at home. An AI startup based out of Bengaluru called Aindra Labs merges facial recognition with a geo-fencing app, that authorities use to verify the people who are currently

under home quarantine, and get notified if anybody moves outside the boundaries that they have been confined to [20].

LeewayHertz, based in Gurugram, has a detection system that employs cameras and adds principles of Computer Vision, to detect people without masks. If the application identifies a user that is not wearing a mask, the app sends out alert messages with the picture of the person, thus enforcing the use of the mask [21].

### **G. Geo-localization**

In this past decade, China has seen a huge surge in the number of mobile apps using geo-localization, and now, geo-localization is being used to fight COVID-19. Baidu Maps, a service that was first launched in China, has come out with an application which displays the infected areas on a map in real time and uses GPS data to give users access to information about such areas. It can also alert users of a potential travel risk. Using GPS, the app can also give the user the distance from their location to infected areas. Other countries could also use geo-localization extensively and come up with similar strategies while exiting from lockdowns [22].

### **H. Medical consultations**

Medical professionals have switched over to telemedicine consultations or virtual clinics [23]. AI-based apps such as Gurgaon and Malaysia-based MyHealthCare provide audio and video consultation facilities, electronic medical record services and speech-to-text prescription services to doctors [24]. Several apps with similar functionality are also available. Remote monitoring could allow the creation of integrated and personalized preventive and treatment care plans that are effective and efficient for patient care, while maintaining social distancing, patient safety, and avoiding unnecessary in-person consultations. Numerous online chatbots have been developed to help recognize early

symptoms of COVID-19 and impart education on hand hygiene [23].

### I. AI-assisted diagnosis

AI-based technologies assist in providing medical support and advice. During the COVID-19 outbreak, almost every country experienced a massive shortage of medical and paramedical personnel, especially in the highly infected areas. The RT-PCR test to diagnose COVID-19 has provided a false-negative result to close to 29 percent of patients [25] and the numbers of test kits available are limited in many countries.

Computer-assisted tomography (CAT) of the chest has been used with artificial intelligence to aid in diagnosing COVID-19. Alibaba launched a tool called 'CAT+AI' Diagnosis Assistant which takes CAT images as input and gives a coronavirus diagnosis within 20 seconds. It does so with the help of image recognition and deep learning technologies, and is highly accurate. Several other countries like Japan have also adopted the technology to help the diagnosis phase [22].

As the lockdown in India opens up in a staggered manner, the number of COVID-19 cases is expected to rise. AI-based solutions could provide a rapid and reliable way to diagnose COVID-19 over the next few months, especially with the limited availability of the RT-PCR test and its limitations.

## IV. CONCLUSION

Artificial intelligence is a major technological disruption that certainly has the potential to provide innovative solutions to enhance the economic growth of nations that are looking to open lockdowns. Through their wide applications in robotics, medicine and public safety, such automated solutions could aid in the fight against COVID-19 in ways that

humans cannot, while also preparing us for future pandemics.

However, it is important to keep in mind that this technology is not the be-all-end-all solution to coping with the COVID-19 crisis. The facial biometrics in use are not as secure as one would like. While a leaked password can be reset, one cannot reset a person's face and fingers. There have also been cases of misidentification of people, which has led to some cities in the US to impose a ban on Facial Recognition technology [15]. Furthermore, Barbieri and Darnis [26] also mentioned that there are tracking systems that are in use in China, Korea and Israel to track COVID-19 cases, and expressed concerns about misuse of data.

Thus, in order to reap the immense benefits of artificial intelligence, one needs to implement such technology in a manner that protects the privacy and confidentiality of its users. The data provided by AI to various companies and government agencies needs to be kept secure, confidential and held in the server or cloud only for a predetermined limited time period; there should be sunset clauses, laws should be revisited regularly and data should be dismantled as soon as it is practical to do so.

There is an urgent need for such AI-based technologies in real time to avoid the spread of the coronavirus, with plenty of opportunities for countries to adopt solutions and achieve the best uptake and utilization of such applications.

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