JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DIGITAL TECHNOLOGY PLAY IMPORTANT ROLE DURING COVID-19

- **Dr. Devendra Singh, Associate Professor, Haryana Institute of Public Administration**

ABSTRACT

The use of technology aids us in attaining our goals in a more efficient manner. There are many ways in which it affects our lives, from education and healthcare to banking and transportation. Technology has a critical role in the prediction and management of natural disasters such as hurricanes, floods, earthquakes, eruptions, landslides, and tsunamis. A digital world without technology is a pointless existence. COVID-19, a new Corona virus that has infected the entire human race, has put the entire planet under lockdown. It affects every aspect of our lives and spreads unnoticed. It's up to everyone in the health care field—police officers, government officials, and hospitals—to fight this infection. Spreading awareness and preventing the disease's pandemic characteristics are made easier thanks to information technology. It is now possible to "Work from Home" in every industry thanks to digital technology. Digital technology and their applications aiding the people of India in their fight against pandemics are examined in this study since India is a developing third-world country with a sizable population COVID-19.

KEYWORDS: PandemicCOVID-19, Digital technologies, Robotics, Mobile applications, Online Learning.

INTRODUCTION

On 31 December 2019, the virus that causes COVID-19 imparts a major outbreak across the globe. People can easily pass on this pandemic virus. In order to safeguard the general public from this rapidly spreading virus, governments around the world have imposed a worldwide lockdown. We've included all of the major employers in the community as well as a wide range of public amenities and services. High-ranking officials instruct the implementation of a number of preventative steps. "Stay at home and keep social distancing" is the best approach to avoid contracting the virus. Despite being under lockdown, COVID-19's spread has spread its wings, leading to its demise. The fields of medicine and digital technology have the promise of resolving this important problem. Since the World Health Organization (WHO) specialists group is currently working on

developing vaccinations against COVID-19, technology plays a vital role in the fight against COVID-19. Drones and robots have become increasingly popular in an age where people are spending less time with one other. As we utilise social media (Facebook, Instagram, and Twitter), smartphones, and web searches, we are constantly exposed to AI and machine learning systems. They might also foresee outbreaks of pandemic diseases and take steps to avoid them. Technology simplifies and streamlines a difficult problem. Some of the digital technologies and software applications currently being used in India to help individuals, medical practitioners, and governments fight COVID-19 in the following ways: tracking corona patients, increasing awareness, and aiding people in their job and social isolation.

THE CURRENT KNOWLEDGE ABOUT VARIOUS TECHNOLOGIES USED DURING COVID-19

This section categorises the technologies into hardware and software based on the type of technology. More than 50 types of software and hardware technologies have been employed in the fight against COVID-19. COVID-19, in contrast to the Spanish flu of a century ago, has rapidly spread over every continent in a matter of weeks. Since the pandemic, the health system's ability to detect, track, and contain patients with probable illness has been considerably enhanced by the deployment of hardware and software technologies that was developed during the epidemic. Technology like computerised tomography machines, smartphones, and video-based communication platforms are transforming not only the medical area but also education, the workplace, and day-to-day life in general. Table-1 provides an overview of the most commonly utilised technology in healthcare, education, work, and personal use throughout the pandemic.

TABLE 1 Major technologies used in COVID-19

Technology type	Healthcare (143)	Education (44)	Work (38)	Daily life (35)
Hardware	Computerized tomography machines (53)	Webcam-enabled computers (8)	Mobile phones (6)	Drones (8)
	Mobile Devices (20)		Webcam-enabled computers (2)	Mobile devices (4)
	Computers (17)	Mobile devices (3)		Computers (3)
	Robots (10)			Robots (4)
	Wearable devices (4)			Automated vehicles (2)
	Video devices (4)			Cameras (7)
	Sensors (3)			
	Digital HIPAA-compliant tools (2)			
	3-Dimensional machines (2)			
Software	*Video-based communication platform (51)*	*Video-based communication platform (12)*	*Tele-work technology (39)*	*Social media (14)*
			• Dataset technology	• Twitter
	• Zoom	• Zoom	• Email	• Instagram
	• Facetime	• WebEx	• Online survey	• Facebook
	• WhatsApp	• Google hangouts	• Google sheets	• YouTube
	• Facebook messenger	*Online lectures (9)*	• SPSS	*Tele-communication Tools (3)*
	Computer or mobile applications (44)	• GitHub	*Video-based communication platform (29)*	• WhatsApp
	• Google apps	• Blackboard		• Email
	• Online survey	• Coursera	• Zoom	*Tracking and control software (9)*
	• NHS attend anywhere	• VoiceThread	• Facebook messenger	
	• Thoracic VCAR software	• Cloud classrooms	• WhatsApp	• Google trends
	• In touch health	• Google cardboard	• LINE	• Geographic information systems
	Information and dataset (23)			
	• Information system			• SPSS
	• Dataset technology			• CRISPR
	• Electronic health records			• Trace together
	Social Media (17)			
	• YouTube			
	• Twitter			
	• Facebook			
	Email (14)			
	Chest X-ray (5)			
Mix use	Artificial intelligence (33)	Artificial intelligence (5)	Artificial intelligence (11)	Artificial intelligence (16)
	Internet of things (4)	Virtual reality (1)	Internet of things (8)	Internet of things (4)
	Virtual reality (4)			

1. Hardware

For early detection and diagnosis of coronavirus, the computerised tomography machine is the most usually reported technology in healthcare facilities, according to Table-1's first section. Initial reverse-transcription polymerase chain reaction (RT-PCR) exhibited a lower sensitivity for the diagnosis of COVID-19, according to Ai (2020). (RT-PCR). The coronavirus disease can be recognised and differentiated from community-acquired pneumonia and other non-pneumonic lung disorders utilising chest computed tomography scanners and deep

learning technology. Video-based mobile devices, computers, and robotics were also cited as essential tools for monitoring and diagnosing the epidemic. Symptomatic therapy and self-isolation instructions are sufficient for the majority of patients with COVID-19 to be handled remotely. In many circumstances, video consultations are preferable to phone consultations because they provide visual signals and therapeutic benefits. Mobile devices and webcam-enabled PCs play a crucial role in providing services and are widely utilised for virtual education, remote job or daily life. Table-1 indicates this. During COVID-19, for example, webcam-enabled computers and mobile devices are required for online conferencing apps such as Zoom and WebEx.

2. Software

In comparison to hardware, software has a larger and more widespread user base and a wider range of applications. Video-based communication tools like Zoom, Face time, and WhatsApp are the most popular in the healthcare industry. COVID-19 and other normal clinical services can be supported simultaneously and asynchronously with the use of remote services such as computer or mobile applications; information and statistics, social media; email; and chest x-ray, for example (Keesara et al., 2020). It is not just in healthcare that video-based communication platforms such as Zoom or WebEx, Facebook Messenger or Google Hangouts are being used; they are also being used for education, employment and daily life purposes. It is possible to conduct online lectures utilising systems such as Git Hub, Blackboard, Coursera, and so on. Using a tool like Voice Thread to produce short films presenting the class material is one example of teaching remotely via a video-based technique (Gewin, 2020). Telework technologies use digital information to exchange virtual services at work in addition to email, online surveys, Google Sheets, and more. In addition, methods and apps such as Google Trends and Geographic Information Systems (GIS) assist in tracking, locating, and analysing epidemics in daily life through the use of social media, including Twitter, Instagram, Facebook, and YouTube.

3. Mix use

Five important "cross-using" technologies, such as the Inter-net of Things, Artificial Intelligence, Computerized tomography, Virtual reality and the Internet of Medical Things integrate hardware and software to monitor, surveillance, detect and pre-vent the onset of a disease or illness.

VARIOUS USER GROUPS IN ALL WALKS OF LIFE

Healthcare, education, the workplace, and others account for the vast majority of technology users. Providers and receivers both have a role to play when discussing technology use. Medical professionals such as radiologists, surgeons, and nurses, as well as patients with chronic illnesses and those infected with infectious diseases, are examples of healthcare providers who employ electronic technology to deliver services. Teachers and students, as well as employees and employers, can be both sources and receivers of information. When it comes to their day-to-day technological use, they are all employing the same type.

1. Healthcare

Pandemic-related digital technology use is dominated by healthcare professionals and patients with various chronic illnesses. Patients' diagnoses and treatment are in the hands of these medical professionals, who include radiologist, surgeon, and nurse. In the words of Ai (2020), radiologists are in a crucial position to determine whether or not a patient's chest computed tomography is positive or negative for COVID-19. Meanwhile, healthcare providers are using technology to treat patients with various chronic ailments, particularly those who have already been infected with the coronavirus. susceptible populations such those with various chronic diseases or immunosuppression will be forced to choose between risking iatrogenic COVID-19 exposure and delaying needed therapy, according to Keesara and colleagues (2020). Face-to-face visits, deferring visits, or adopting virtual healthcare all need patients to deal with the unavoidable use of technology, such as computed tomography machines and video-based communication platforms. There are a lot of healthcare professionals and their clients using COVID-19's technology.

2. Education

As a result of the outbreak, a huge number of students were compelled to pursue their education from the comfort of their own homes. Video-based devices and platforms are preferred by the majority of educators and students. This pandemic has made them the second-largest digital technology consumers. Students are more involved when teachers put in the extra time to prepare for online courses, invent new ways to teach, develop lessons, and patiently change students from passive recipients to engaged learners. Leonardo Rolla, a mathematician who also teaches two terms a year at New York University (NYU) of Shanghai in China, is an example from Gewin (2020). During COVID-19, he devised a technology-assisted teaching technique for his advanced linear-algebra class that included students from across the globe. Educators are another set of professionals that may choose to work from home, as shown in this case.

3. Work

During the epidemic, the group of people who use technology for their jobs has changed dramatically. This year's COVID conference will see researchers, scientists, and personnel from all walks of life working from home using digital technology. When it comes to telework, unlike in the fields of healthcare and education, it might be difficult to determine who is providing the technology and who is receiving it. When it comes to their jobs, most professionals are both providers and receivers of information, regardless of the technology they utilise. An employee, for example, may use Zoom to seek guidance from their manager while also reporting their work.

4. Others

The general public as well as public health authorities, government officials, and others, are also active users of digital technology. People from all around the world are familiarising themselves with modern technology in order to combat this global pandemic. The mobile-based tracking technology or the big data technology can be used by public health authorities and government officials to monitor the spread of the pandemic. Additionally, the general populace worldwide is getting their knowledge via digital gadgets.

DIGITAL TECHNOLOGIES IN THE PUBLIC-HEALTH

Controlling the COVID-19 pandemic relies on the discovery and containment of infection clusters and the interruption of community transmission to minimise the impact on human health, as has been the case with previous outbreaks and pandemics. During the 14th-century plague outbreak, areas impacted by the disease were isolated and population movement was restricted to prevent the disease from spreading further. These public health approaches for epidemic response, including surveillance, rapid case identification, interruption of community transmission, and robust public communication, are applicable today. It's critical to keep tabs on the effectiveness of these measures and the incidence and mortality rates they affect. The International Health Regulations (2005) require that all countries have fundamental capabilities to ensure national preparation for infectious risks with the potential to spread worldwide. During outbreaks, when new methods and technologies are urgently needed, researchers and developers work to improve these foundational capabilities. Hong Kong used electronic data systems to locate disease clusters during the 2003 outbreak of severe acute respiratory syndrome. Mobile phone data were utilised to predict travel patterns during the Ebola epidemics in West Africa in 2014–2016, and handheld sequencing equipment allowed for more effective contact tracing and a better understanding of the outbreak dynamics. Each of the four public-health initiatives outlined above has been bolstered by digital technology in the COVID-19 pandemic. Innumerable facets of daily life have been reshaped by the digital epoch. As of 2019, 67% of the world's population have access to mobile devices, with 66% of those being smartphones. At the beginning of 2020, there were 3.8 billion active social media users16 worldwide17. In this article, we examine how digital technologies are being used to combat COVID-19 in public health around the world (Fig. 1). Innovations and their limits are discussed in depth. Using a systems-level perspective, we can better understand how digital tactics may be integrated into COVID-19-control measures and better anticipate future epidemics.

Fig. 1 - The interconnected digital technologies used in the public-health response to COVID-19

DIGITAL CONTACT TRACING

It's impossible to do contact tracing without digital tools on a scale and pace that isn't easily matched. Reducing human recollection is especially important in densely populated places where people are constantly on the go. A number of countries have developed digital contact-tracing apps in response to the COVID-19 epidemic, which rely on methodologies and technologies that have never before been tested on this scale and are therefore contentious with respect to privacy. It's critical to assess how accurate and effective they are. Concerns regarding privacy arose early on with early attempts at digital tracking. In South Korea, linked location, surveillance, and transaction data was used to trace the contacts of confirmed cases. To ensure the safety of its users, AliPay Health Code implemented severe quarantine procedures in China, limiting the transactions that might be made by those regarded to be at high risk. Several countries have collaborated on the development of new voluntary contact-tracing apps that collect location data via GPS or cellular networks, proximity data via Bluetooth, or a mix of the two.

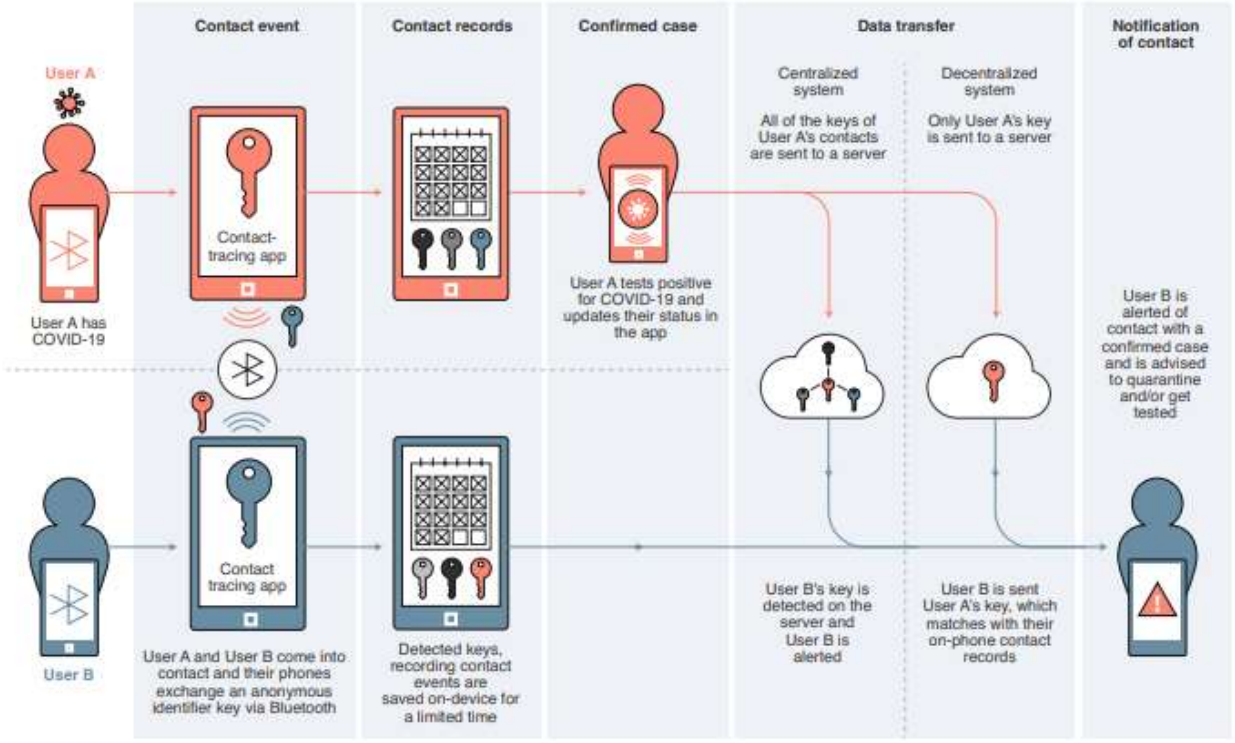

Fig. 2 - Contact tracing for COVID-19 with Bluetooth-enabled smartphone apps

Centralized systems (Fig. 2) and GPS tracking have been criticised. As a result of a complaint from the country's data-protection authority, Norway has suspended the usage of and data collecting from its Smittestopp app, which collects location data that is 'disproportionate to its mission'. Several multinational frameworks with varying levels of privacy preservation are evolving, including the Decentralized Privacy-Preserving Proximity Tracing, the Pan-European Privacy-Preserving Proximity Tracing project and the collaborative Google–Apple frameworks. In order for contact-tracing applications to be effective in preventing community transmission, a substantial proportion of the population must utilise the app and follow recommendations (effective reproduction number (R),1)). To put this in perspective, only 30% of Singaporeans had downloaded the Trace Together app as of June 2020. Smartphone ownership, user trust, usability, and compatibility also hinder adoption. Major concerns remain, such as determining which contacts are close enough to transmit and how much time has passed before a warning should be issued. Human interpretation may still be crucial even when the effectiveness of the system in recognising transmission events is not fully documented.

MOBILE APPLICATIONS LAUNCHED BY THE CENTRAL AND STATE GOVERNMENT OF INDIA

Smart phones play a major role in fighting against this deadly situation. There are a plethora of tools available for locating a COVID-19 carrier. It's really simple to install these apps on smart phones. The central government and state governments are making the use of COVID-19-compliant applications a requirement. In order to track patients and notify anyone who come into contact with them, these applications rely heavily on Bluetooth and GPS technology.

1. Aarogya Setu

Aarogya Setu" is a smartphone application that the Prime Minister of India has advised citizens of India to download in order to combat COVID-19. Because of its use of technology, it produces valuable data. According to a tweet he made, "As more and more people utilise it, its effectiveness will improve." The National Informatics Centre of India's Ministry of Electronics and Information Technology developed the application. This app is based on Singapore's popular "Trace Together" community tracking tool. In 2020, the government of India launched the Aarogya setu. Any confirmed COVID-19 user can be identified via Bluetooth. It is possible to use this software in 11 different languages including English and Hindi. It may be used on both Android and iOS platforms. Android and iOS versions of this software are available in the play store. There is an official government site, mygov.in, where you can download this software. The self-assessment test is completed in the chat box by the user. Gender, age, travel history and symptoms are all necessary. Detection and alerting are the primary functions of the COVID-19 detector. This app has been downloaded into mobile devices by 9.8 million people as of this writing. All central government officials, professionals on the job, students, and the general public are required by the federal government to stop the spread of this pandemic.

2 Corona Kavach

The Ministry of Electronics and Information Technology (MeitY) and the Ministry of Health and Family Welfare (MoHFW) have jointly released the Corona Kavach application (MoHFW). The Google Play store has it. When this programme is activated, a real-time location of the infected users is provided. Governments in other states have also taken measures to stop the outbreak. The development of mobile applications is one of the most prominent and essential components. These applications are used to locate or identify who is affected and to diagnose COVID 19 symptoms based on the user data.

USAGE OF INTERNET DURING LOCKDOWN

A new era wouldn't be possible without the Internet and digital technology. World-wide, the Internet has become a more important tool than ever before. It has a big impact on education, business, social media, banking, and healthcare, to name a few industries. Using a desktop, laptop, or even a mobile phone, you can access the Internet. All smartphones on the market now have internet access. During the lockdown, internet usage has skyrocketed. In this pandemic lockdown, it is the only way to continue our work when we are isolated from our workplaces.

1. Work from Home (WFH)

WFH, or work from home, is becoming more commonplace across all industries. Every business and key institution has urged its staff to work from home during this stressful time due to the need to maintain social

distance. As a result, nearly all of the company's employees were able to work from home. Of the total workforce, 65 percent are from large cities, with the remaining 35 percent hailing from smaller towns. To be able to work from home, you'll need a desktop or laptop computer, as well as a reliable LAN or Wi-Fi connection and an ongoing power source.

2. Online Learning

As a result of the corona virus pandemic, educational institutions all around the world were forced to close. This has led to a significant shift in the style of instruction with the advent of online learning, where instruction is delivered digitally via a digital platform. The teaching and learning process is supported by a variety of application tools. Many students use applications such as Zoom, Google classroom, YouTube, Mail, and WhatsApp. Online courses (free and paid) allow students to expand their knowledge in a more effective manner. Convenience, affordability, and efficiency are three of online education's most appealing features.

3. Webinar and Video Conferencing

Working and teaching professionals' lives have been made easier and more convenient thanks to the internet. Lecture, workshop, or seminar that is conducted via the internet and via video conferencing technology (Webinar) is called a web-based seminar (Webinar). A computer, web cam, microphones, and a headphone set are all that are required. Webinars open our eyes to a whole new world of possibilities for career growth and development. For the duration of quarantine, a number of organisations and universities are providing educational webinars. During this pandemic crisis, webinars serve an important role in educating the public. The most important advantages of a webinar are its flexibility, the ability to choose from a wide range of courses, and its cost-effectiveness. There are a variety of apps that can be used to communicate with each other, hold virtual lectures, workshops and so on. Using this digital medium, senior authorities from many countries and states communicate with officers on the ground. In this way, they are immediately connected, which helps them understand the situation and aids in making judgments. Many organisations and universities were inspired by this type of application to connect their students with their mentors in order to complete the course.

4. E- banking

Electronic banking and payments are critical during this COVID-19 since ATMs have been depleted by the financial crisis. In order to prevent the spread of the corona virus, most of the bank's services are offered online. Reserve Bank of India, the government, and other banks are urging customers to conduct their banking transactions on a digital platform.

5. eOffice

eOffice is a simple and secure digital solution for processing file from Govt. Department developed by NIC. This digital workplace solution not only increase efficiency but also save paper work in the Govt. Dept. This software is being used by Govt. officers/officials during Covid-19 for efile work from home.

CONCLUSION

All nations on this one planet came together to devise a variety of ways to stop the spread of the disease. During a pandemic, the I.T. and digital technology industries have proven to be indispensable. Robots in hospitals will reduce the demand for personal protective equipment. Even in the event of a pandemic, where human interaction is minimal, it can help healthcare staff monitor patients. We can stay in touch with those we don't see as often with the help of these tools. The development of mobile applications is one of the most prominent and essential components. There is a lot of technical software running in the background for all of these programmes. According to this study, India is still stumbling toward its goal of becoming a DIGITAL INDIA, as many rural areas lack internet access and residents are unsure of how to utilise it. Security and high-speed Internet connectivity are among the most pressing challenges that deserve the most attention from researchers and policymakers alike. All industries must have enough I.T. infrastructures, and tasks that can be mechanised or kept electronically open the door to workers working from home without harming the economy should be.

REFERENCES

Ai, T., Yang, Z., Hou, H., Zhan, C., Chen, C., Lv, W.,...Xia, L. (2020). Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19)in China: A report of 1014 cases.Radiology,200(642), 32–40.

Baert, S., Lippens, L., Moens, E., Weytjens, J., & Sterkens, P. (2020).TheCOVID-19 crisis and telework: A research survey on experiences, expecta-tions and hopes. (Global Labor Organization Discussion Paper No. 532).Available from http://hdl.handle.net/10419/216771

Belzunegui-Eraso, A., & Erro-Garcés, A. (2020). Teleworking in the contextof the COVID-19 crisis.Sustainability,12(9), 3662.

Boulos, M. N. K., & Geraghty, E. M. (2020). Geographical tracking andmapping of coronavirus disease COVID-19/severe acute respiratorysyndrome coronavirus 2 (SARS-CoV-2) epidemic and associatedevents around the world. International Journal of Health Geographics,19, 8 (2020).

Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M.,Edelstein, M.,...Short, M. J. (2020). Digital technologies in the public-health response to COVID-19.Nature Medicine,26,1–10.

Cai, G., & Cai, G. (2020). COVID-19: Remote tech spares clinicians.Nature,581(7806), 30.

Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dash-board to track COVID-19 in real time.The Lancet Infectious Diseases,20(5), 533–534.

Geldsetzer, P. (2020). Use of rapid online surveys to assess people's per-ceptions during infectious disease outbreaks: A cross-sectional surveyon COVID-19.Journal of Medical Internet Research,22(4), e18790.

Gewin, V. (2020). Five tips for moving teaching online as COVID-19 takeshold.Nature,580(7802), 295–296.

Golinelli, D., Boetto, E., Carullo, G., Landini, M. P., & Fantini, M. P. (2020).How the COVID-19 pandemic is favoring the adoption of digital tech-nologies in healthcare: A rapid literature review.medRxivpreprint.https://doi.org/10.1101/2020.04.26.20080341.

Greenhalgh, T., Koh, G. C. H., & Car, J. (2020). Covid-19: A remote assess-ment in primary care.BMJ,368, m1182.

Greenhalgh, T., Wherton, J., Shaw, S., & Morrison, C. (2020). Video consul-tations for covid-19.BMJ,368, m998.

Hollander, J. E., & Carr, B. G. (2020). Virtually perfect? Telemedicine forCOVID-19.New England Journal of Medicine,382(18), 1679–1681.

Keesara, S., Jonas, A., & Schulman, K. (2020). COVID-19 and health care'sdigital revolution.New England Journal of Medicine,382(23), e82.

Li, L., Qin, L., Xu, Z., Yin, Y., Wang, X., Kong, B.,...Cao, K. (2020). Artificialintelligence distinguishes COVID-19 from community acquired pneu-monia on chest CT.Radiology,19, 200905.

Naudé, W. (2020). Artificial intelligence against COVID-19: An earlyreview. Institute of Labor Economics Discussion Papers No. 13110.Available from http://hdl.handle.net/10419/216422.

Schulz, W. L., Durant, T. J., Torre, C. J., Jr., Hsiao, A. L., & Krumholz, H. M.(2020). Agile health care analytics: Enabling real-time disease surveil-lance with a computational health platform.Journal of Medical InternetResearch,22(5), e18707.

Sun, L., Tang, Y., & Zuo, W. (2020). Coronavirus pushes education online.Nature Materials,19(6), 687–687.