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Using COVID-19 Pandemic as an Opportunities for Technology Usage Inspiration and Innovation for African Countries

Gizealew Alazie Dagnaw[1], Sisay Ebabye Tsigie[2], Department of Information Science, College of Informatics, University of Gondar, Ethiopia[12], Email address of the author: gizeinstra@gmail.com[1], sisebe2007@gmail.com[2]

ABSTRACT

In developing nations, and on the African continent in particular, the uptake and impact of technological and other developments is often slower than in other parts of the world. While pockets of development exist on the continent as a source of work, education and access much of Africa remains trapped in a cycle of poverty. In this worldwide health crisis, the medical industry is looking for new technologies to monitor and controls the spread of COVID19 (Coronavirus) pandemic. AI is one of such technology which can easily track the spread of this virus, identifies the high-risk patients, and is useful in controlling this infection in real-time. Educators have created online classrooms in a matter of days. Information resources to educate the public and track the spread of the virus using big data sprang up seemingly overnight. Finally, those of us fortunate enough to have jobs that allow us to work from home are learning the full potential of the communication technologies that the 21st century has bestowed upon us. None of these tasks have been easy, but individuals and organizations have demonstrated the motivation and mind shifts needed to research, innovate, and act quickly. AI embodies the field of knowledge that seeks to create machines (computers) that can emulate human cognitive functions such as learning, reasoning, understanding, vision, perception, recognition, and problem solving to a reasonable level. Computers that have AI capabilities are currently being used in several real-world domains to solve problems. AI has already played a significant role in each stage of fighting the COVID-19 pandemic. Some areas where we saw immediate applications include the processing of large amounts of data to find patterns that could lead to the discovery of potential treatment drugs; as well as treating infected people. The novel aspect of this pandemic involves several unknowns and is likely to have a lingering impact for years to come. However, despite the current climate, I am somewhat comforted that the history of past pandemics and crises suggests an eventual recovery plan for the world. After all, necessity is the mother of all invention. New creations arise out of disruption.

Key words: Artificial intelligence, COVID-19, ICT, Innovation and Inspiration

1. INTRODUCTION

In this worldwide health crisis, the medical industry is looking for new technologies to monitor and controls the spread of COVID19 (Coronavirus) pandemic[1]. AI is one of such technology which can easily track the spread of this virus, identifies the high-risk patients, and is useful in controlling this infection in real-time. It can also predict mortality risk by adequately analyzing the previous data of the patients. AI can help us to fight this virus by population screening, medical help, notification, and

suggestions about the infection control. The COVID-19 pandemic will have far-reaching and long-term effects on populations and economies worldwide[2]. Besides its immediate impact on health, the socioeconomic consequences of the pandemic are likely to be felt by economic actors over the world, and the populations of developing countries and economies in transition are expected to be among those most vulnerable to suffer from COVID-19-related challenges. UNAIDS is supporting one of the innovators of the Health Innovation Exchange platform in implementing an AI-based system for COVID-19 detection. Infer vision, which specializes in AI-powered diagnostics from medical imaging, adapted its technology to support doctors to diagnose cases of COVID-19. By calculating required information in less than 10 seconds (as opposed to the 15 minutes of a manual interpretation), this AI solution has detected tens of thousands of coronavirus cases in China and Europe. To make video conferencing a more personal experience, ITC-ILO adopted a more immersive form of communication and collaboration through virtual reality conferencing using the Oculus Quest Headset Devices. Ten trainers took their first training of trainer's certification leveraging this new technology and are ready to partner up with other UN Entities to accelerate these immersive learning and training experiences. Contact ITC-ILO if you want to organize your next virtual event in a more immersive way. Members of UN Global Pulse's data science team worked with researchers from WHO and the MILA-Quebec AI Institute to map the landscape of AI applications that are being built to tackle the pandemic[3]. The research focused on three specific areas: 1) individual patient diagnosis and treatment; 2) protein and drug discovery related research; and 3) the socio-economic impact of the disease.At the movement cannot be solve challenging problems overnight, the engagement of companies, universities, governments, non-profits, and individuals around the world has shown that society can focus on tackling real-world challenges quickly. Early research emanating from universities and health agencies in China helped the rest of the world understand the impact of COVID-19, and scientific research efforts continue to grow worldwide[4]. Healthcare workers are our heroes in saving lives, but are also changing how healthcare is delivered. Rapid testing kits to detect the virus were developed within weeks, including Alibaba's machine-learning image-detection model, which detects COVID-19 in 15 seconds. Meanwhile, vaccine development is well underway[5].

Company supply chains are also adapting in a manner reminiscent of World War II, when factories were repurposed to build war supplies. For example, the luxury goods company LVMH converted its perfume factory to produce hand sanitizer for France's healthcare sector last month. Taiwanese electronics giant Foxconn has started making masks. Fashion designers have temporarily pivoted from evening gowns to medical gowns, and automakers are in discussions with governments to make ventilators. Engineers are using 3D printers to create plastic shields for healthcare workers. The list goes on and on. These individuals and organizations are rising to action to do their part.To keep the world running, supermarkets and logistics services have developed safety protocols to protect their employees and customers. Restaurants have come up with ways to ensure at-risk communities still have access to food. Educators have created online classrooms in a matter of days. Information resources to educate the public and track the spread of the virus using big data sprang up seemingly overnight. Finally, those of us fortunate enough to have jobs that allow us to work from home are learning the full potential of the

communication technologies that the 21st century has bestowed upon us. None of these tasks have been easy, but individuals and organizations have demonstrated the motivation and mind shifts needed to research, innovate, and act quickly. The Global Innovation Index (GII) 2020 will look at a long-held business and policy concern: How to boost innovation-driven entrepreneurship and social, cultural and economic growth. Now, as a worldwide economic shock aggravates the toll of a global pandemic, the GII 2020 will also investigate the pressing need for new methods of innovation funding in a post-COVID world[6].

2. JUSTIFICATION

These days, it is easy to focus on the negative. The spread of COVID-19 is having a devastating effect on countries' economies and their citizens' health. The novel aspect of this pandemic involves several unknowns and is likely to have a lingering impact for years to come. However, despite the current climate, I am somewhat comforted that the history of past pandemics and crises suggests an eventual recovery plan for the world. After all, necessity is the mother of all invention. New creations arise out of disruption. My optimism is elevated by seeing the massive creativity and initiative of individuals coming together to solve the problem at hand through innovation. In particular, three inspiring phenomena have caught my attention.COVID-19 may be having a devastating impact on our industries, social lives and personal grooming standards, but it is also prompting an outpouring of creativity in other arenas. UNICRI is researching the use of AI, drones, big data and related technologies to enhance surveillance capacities as part of national efforts to tackle the COVID-19 pandemic, with a particular emphasis on measures that law enforcement and security services can take to ensure that this is done in a responsible and human rights compliant manner[7]. To take advantage of the groundswell of technological creativity and scout for new COVID-inspired strokes of genius. The surge in innovation is drawing comparisons to another era of great duress and great ingenuity: the Second World War. Several inventions that first saw the light of day in the white heat of that desperate global struggle have since become essential features of our daily lives.Take, for instance, rocket technology, which in decades following the war helped humanity put a man on the moon and send satellites into orbit. Both jet aircraft engines and pressurized cabins were first pioneered in the 1939–45 conflict since absorbed into commercial airline technology[8].The COVID-19 pandemic has profoundly influenced the lives of most people on the planet. It has changed daily activities; something as simple as a walk in the park is perceived very differently now. The same is true for businesses. Many businesses have shut down or changed to accommodate social distancing.

3. OBJECTIVE

All communities in Africa, particularly in the health care and governance sectors, are developing and deploying a range of artificial intelligence (AI) systems in emergency response to COVID-19.

4. METHODOLOGY

Using technical frameworks, such as machine learning, AI systems use algorithms to make inferences from data about people[9]. This includes demographic attributes, preferences, and likely future behaviors. To effectively serve a range of populations, AI systems must learn to make associations based on massive amounts of data that accurately reflect information across identities. However, the data they rely on is often rife with social and cultural biases. Data might not exist for certain populations, may exist but be poor quality for certain groups, and/or reflect inequities in society. As

a result, algorithms can make inaccurate predictions and perpetuate social stereotypes and biases. Another recent application of AI is contact tracing, or tracking people who have come into contact with the virus to help contain it. By tracking user information such as health and location, and using AI-powered facial recognition, these tools can enforce social distancing and inform citizens of contact with positive cases[10]. In China, users are assigned a coronavirus score, which impacts their access to public transportation, work, and school. And US government officials have begun raising the possibility of mass surveillance, collecting "anonymized, aggregate" user location data from tech giants like Facebook and Google to map the spread of COVID-19.But surveillance tools have ethical implications again, particularly for marginalized populations. Using AI to decide who leaves their home could lead to a form of COVID-19 redlining, subjecting certain communities to greater enforcements. This calls to mind another AI model that results in higher surveillance of poor communities of color: predictive policing. In the United States, risk-assessment algorithms use criminal history information, but don't take into account deep-rooted racial bias in the policing system, that black Americans are arrested more often for smaller crimes and that neighborhoods with high concentration of black Americans are more heavily patrolled. Black Americans end up overrepresented in the data, which then links to racially bias policing outcomes. Similarly, communities impacted by proposed surveillance systems would likely be poorer communities of color harder hit by COVID-19 for a variety of reasons linked to historical inequities and discrimination. It is not clear how or how long government agencies or other entities in Africa will use these types of AI tools[11].

5. FINDING

Amidst the current global pandemic, while we are witnessing new challenges and coping with uncertainty, technologies like Artificial Intelligence (AI), Machine Learning (ML), Robotic Process Automation (RPA), Blockchain, etc. have become our ammunition to fight this war. There is a renewed vigor in companies and start-ups to innovate and build solutions that can help flatten the curve. Artificial intelligence (AI) is one of the means or avenues to understand the virus and develop preventative and control measures. This includes but is not limited to: the usage of mathematical modeling to understand virus transmission, structural biology to determine virus structure and develop vaccines, computational biology to understand virus evolution, as well as docking studies to screen for drugs and inhibitors[11].

AI is playing a crucial role in propelling this innovation. The role of AI in mitigating COVID-19 is making a huge impact across industries and especially in the healthcare sector. In addition to Healthcare, AI is also making an impact on other industries and verticals by solving various challenges like efficient remote working, supply chain disruption, and a lot more. As the COVID-19 coronavirus outbreak continues to spread across the globe, companies and researchers are looking to use artificial intelligence as a way of addressing the challenges of the virus. Here are just some of the projects using AI to address the coronavirus outbreak. A number of research projects are using AI to identify drugs that were developed to fight other diseases but which could now be repurposed to take on coronavirus. By studying the molecular setup of existing drugs with AI, companies want to identify which ones might disrupt the way COVID-19 works[12].

From social media, mobile payment, e-commerce to e-government, digital technologies have transformed the way people interact, businesses conduct commercial transactions and governments deliver public services in recent decades. Confronting the ongoing COVID-19 crisis, digital technologies have shown a great potential beyond improving convenience or efficiency, playing an indispensable role in sustaining social and economic activities. Challenges and risks also emerge in embracing various digital innovations[13].

First, digital platforms allow a smooth and rapid transition of tremendous offline undertakings to online activities. As mobility constraints intensify due to government orders or rising health concerns, digital platforms that support live-video communication offer solutions for seamless remote study or work. Moreover, e-commerce, which has taken root in many countries, is gaining popularity during the crisis. E-commerce platforms in Southeast Asia such as Lazada, Tokopedia and Shoppe have seen sales boost and an influx of new online merchants. Innovative ways to facilitate e-commerce have also emerged[14]. Livestream e-commerce has become the go-to option for sellers and consumers in China during the pandemic. Salespeople start to engage with potential customers through live streaming since they cannot conduct face-to-face product presentations as they used to do in brick-and-mortar stores. On Taobao.com, China's largest B2C e-commerce platform, live stream e-commerce merchants increased by seven-fold in February. Augmented reality or virtual tools adopted by retailers such as Ikea or Wayfair are being used more often in introducing products to customers virtually[15].

Reliable, fast, and affordable fixed-line and mobile broadband connections is a prerequisite to exploit the above-mentioned digital innovations. However, there exists a wide digital divide across and within countries. Until 2018, in low income countries, the mobile cellular subscription rate is 66 per 100 inhabitants, and the fixed broadband connection rate is as low as 0.74 per 100 people, compared to 128 mobile cellular subscribers per 100 inhabitants and 33.6 fixed broadband subscribers per 100 inhabitants in developed countries. Those who are not digitally connected face severe difficulties in receiving the most updated public health information, conducting life activities virtually or exploiting new digital working opportunities. There is a significant gap, underscoring the urgency of digital infrastructure investments.

Second, gig work, a new work arrangement that utilizes digital platforms such as Grab, Upwork, and DoorDash to connect workers to employers and those posting tasks, has come into the spotlight during the crisis. As many people start to rely on online ordering for food or daily essentials, demand for delivery services is surging as observed in many food delivery platforms such as Grab Food in Southeast Asia[16].

Third, governments are also leveraging digital technologies to combat the COVID-19 crisis. E-government practices such as filing taxes online or submitting business registration forms online, which are recognized as efficient administrative procedures by the *Doing Business* report, ensure the continued provision of public services. Korea and Singapore are using contact tracing to identify people who have contagion risks. Israel is using cellphone location data to retrace the movement of individuals who test positive for the virus. China is adopting a QR code, with colors of green, yellow and red indicating people's health risks, to allow access to public transportation or workplaces for those who are considered low-risk. This aims to enable healthy people to move freely in order to minimize the

negative impact on the economy, while ensuring that those who may have been exposed to the virus are in quarantine. However, data privacy concerns are also rising as governments explore digital options to halt the spread of the virus. Some governments are revealing anonymized information about confirmed infection cases, such as the person's workplace or normal commute route, as an alert to the public. Such detailed information increases the likelihood of making infected people identifiable, putting them at risk of social stigma. This calls for transparent and consistent rules and regulations on enabling data usage for public health purpose while safeguarding individual rights, which is a key aspect measured under the ongoing *Digital Business Indicators* initiative. Inspired by the *Doing Business* project, the *Digital Business Indicators* aims to develop a benchmarking tool to measure the extent to which countries' laws and regulations, among other factors, help expand access to high quality and affordable internet; establish a competitive digital market; protect personal data; enable digital monetary transactions; facilitate the delivery of goods to consumers; and effectively tax digital businesses[17].

6. DISCUSSION ON THE FINDING

Artificial Intelligence technology can today automatically mine through news reports and online content from around the world, helping experts recognize anomalies that could lead to a potential epidemic or, worse, a pandemic. In other words, our new AI overlords might actually help us survive the next plague. These new AI capabilities are on full display with the recent coronavirus outbreak, which was identified early by a Canadian firm called BlueDot, which is one of a number of companies that use data to evaluate public health risks[18]. More broadly, AI is already assisting with researching new drugs, tackling rare diseases, and detecting breast cancer. There's also increasing interest in using non-health data like social media posts to help health policymakers and drug companies understand the breadth of a health crisis. For instance, AI that can mine social media posts to track illegal opioid sales, and keep public health officials informed about these controlled substances' spread. Still, all of these advancements represent a more optimistic outlook for what AI can do. Typically, news of AI robots sifting through large swathes of data doesn't sit so well. Think of law enforcement using facial recognition databases built on images mined from across the web. Or hiring managers who can now use AI to predict how you'll behave at work, based on your social media posts. The idea of AI battling deadly disease offers a case where we might feel slightly less uneasy, if not altogether hopeful. Perhaps this technology if developed and used properly could actually help save some lives[12].

Artificial Intelligence is an upcoming and useful tool to identify early infections due to coronavirus and also helps in monitoring the condition of the infected patients. It can significantly improve treatment consistency and decision making by developing useful algorithms. AI is not only helpful in the treatment of COVID-19 infected patients but also for their proper health monitoring. It can track the crisis of COVID-19 at different scales such as medical, molecular and epidemiological applications. It is also helpful to facilitate the research on this virus using analyzing the available data. AI can help in developing proper treatment regimens, prevention strategies, and drug and vaccine development. Innovators Are Adapting Existing Technologies to Fight COVID-19.The computer vision system can measure heart rate of people based on changes in their skin tone. Heart beating causes variation in blood flow in the face and other places in the body[10].

In particular, the barriers and enabling factors to scaling up innovative approaches can be completely different in developing countries as compared with high-income countries because of differences in demographic characteristics, the level of informality in the economy, fiscal space, institutional capacity, ITC and information infrastructure, and effective mobilization networks. Before COVID-19, most people had some degree of apprehension about robots and artificial intelligence. Though their beliefs may have been initially shaped by dystopian depictions of the technology in science fiction, their discomfort was reinforced by legitimate concerns. Some of AI's business applications were indeed leading to the loss of jobs, the reinforcement of biases, and infringements on data privacy. Those worries appear to have been set aside since the onset of the pandemic as AI-infused technologies have been employed to mitigate the spread of the virus. We've seen an acceleration of the use of robotics to do the jobs of humans who have been ordered to stay at home or who have been redeployed within the workplace. Labor-replacing robots, for example, are taking over floor cleaning in grocery stores and sorting at recycling centers. AI is also fostering an increased reliance on catboats for customer service at companies such as PayPal and on machine-driven content monitoring on platforms such as YouTube. Robotic telepresence platforms are providing students in Japan with an "in-person" college graduation experience. Robots are even serving as noisy fans in otherwise empty stadiums during baseball games in Taiwan [7]. In terms of data, AI is already showing potential in early attempts to monitor infection rates and contact tracing.

7. CONCLUSION

Since the current outbreak of COVID-19 emerged, many individuals and households are using Information and Communications Technologies (ICTs) to minimize the disruption and circumvent some of the obstacles they face in getting on with their daily lives.For example, many people have resorted to using the Internet to work from home, to order essential items for home delivery, or to continue their children's learning. Some of the ICT-related data that is beginning to emerge reveals the scale of the profound changes that are impacting people's lives around the world. For example, data released by Googlefrom users of their maps service identifies large changes to people's daily movements between home and places of work or recreation.AI has the potential to help in all the stages of healthcare, from syndromic surveillance through to rapid diagnosis tests, and faster drug development. AI-based systems are already being deployed to diagnose coronavirus infection in China.AI tools and techniques can help policymakers and the medical community understand the COVID-19 virus and accelerate research on treatments by rapidly analyzing large volumes of research data. AI text and data mining tools can uncover the virus' history, transmission, and diagnostics, management measures, and lessons from previous epidemics. Deep learning models can help predict old and new drugs or treatments that might treat COVID-19. Several institutions are using AI to identify treatments and develop prototype vaccines. Deep Mind and several other organizations have used deep learning to predict the structure of proteins associated with SARS-CoV-2, the virus that causes COVID-19. AI can also be employed to help detect, diagnose and prevent the spread of the virus. Algorithms that identify patterns and anomalies are already working to detect and predict the spread of COVID-19, while image recognition systems are speeding up medical diagnosis. For example:AI-powered early warning systems can help detect epidemiological patterns by mining mainstream news, online content and other

information channels in multiple languages to provide early warnings, which can complement syndrome surveillance and other healthcare networks and data flows (e.g. WHO Early Warning System, Bluedot)[19].

AI tools can help identify virus transmission chains and monitor broader economic impacts. In several cases, AI technologies have demonstrated their potential to infer epidemiological data more rapidly than traditional reporting of health data. Institutions such as Johns Hopkins University and the OECD (oecd.ai) have also made available interactive dashboards that track the virus' spread through live news and real-time data on confirmed coronavirus cases, recoveries, and deaths.Rapid diagnosis is key to limit contagion and understand the disease spread. Applied to images and symptom data, AI could help to rapidly diagnose COVID-19 cases. Attention must be given to collecting data representative of the whole population to ensure scalability and accuracy.

8. RECOMMENDATION

Various AI systems are proving incredibly valuable to tackling the pandemic, and others hold immense promise. But leaders must take care to develop, manage, and use this technology responsibly and equitably; the risks of discrimination and deepening inequality are simply unacceptable.

Abbreviation and acronym

Information and Communications Technologies (ICTs)**,** Artificial intelligence (AI),Machine Learning (ML), Robotic Process Automation (RPA),United Nations Interregional Crime and Justice Research Institute(UNICRI)

Reference

[1] M. Nemati, "Article Machine-Learning Approaches in COVID-19 Survival Analysis and Discharge-Time Likelihood Prediction Using Clinical Data Machine-Learning Approaches in COVID-19 Survival Analysis and Discharge-Time Likelihood Prediction Using Clinical Data," *Patterns*, p. 100074, 2020, doi: 10.1016/j.patter.2020.100074.

[2] A. S. Ahuja, V. P. Reddy, and O. Marques, "Artificial intelligence and COVID-19: A multidisciplinary approach," *Integr. Med. Res.*, vol. 9, no. 3, p. 100434, 2020, doi: 10.1016/j.imr.2020.100434.

[3] W. Naudé, "Artificial intelligence versus COVID-19 in developing countries," no. May, 2020.

[4] R. Vaishya, M. Javaid, I. H. Khan, and A. Haleem, "Artificial Intelligence (AI) applications for COVID-19 pandemic," *Diabetes Metab. Syndr. Clin. Res. Rev.*, vol. 14, no. 4, pp. 337–339, 2020, doi: 10.1016/j.dsx.2020.04.012.

[5] K. Zhang *et al.*, "Clinically Applicable AI System for Accurate Diagnosis, Quantitative Measurements, and Prognosis of COVID-19 Pneumonia Using Computed Tomography," *Cell*, 2020, doi: 10.1016/j.cell.2020.04.045.

[6] OECD, "Using artificial intelligence to help combat COVID-19," no. April, pp. 1–5, 2020.

[7] W. Naudé, "Artificial Intelligence against COVID-19: An Early Review," *IZA Discuss. Pap.*, no. 13110, 2020.

[8] S. Scher, *Artificial intelligence in weather Learning atmospheric dynamics*. 2020.

[9] H. M. Yassine and Z. Shah, "How could artificial intelligence aid in the fight against coronavirus?: An interview with Dr Hadi M

Yassine and Dr Zubair Shah by Felicity Poole, Commissioning Editor," *Expert Rev. Anti. Infect. Ther.*, vol. 18, no. 6, pp. 493–497, 2020, doi: 10.1080/14787210.2020.1744275.

[10] W. Naudé, "Artificial intelligence vs COVID-19: limitations, constraints and pitfalls," *AI Soc.*, no. 0123456789, 2020, doi: 10.1007/s00146-020-00978-0.

[11] L. Li *et al.*, "Using Artificial Intelligence to Detect COVID-19 and Community-acquired Pneumonia Based on Pulmonary CT: Evaluation of the Diagnostic Accuracy," *Radiology*, vol. 296, no. 2, pp. E65–E71, 2020, doi: 10.1148/radiol.2020200905.

[12] M. Peng *et al.*, "Artificial Intelligence Application in COVID-19 Diagnosis and Prediction," *SSRN Electron. J.*, no. January, 2020, doi: 10.2139/ssrn.3541119.

[13] I. T. U. Webinar, T. Muluk, and M. Romao, "Importance of 5G and AI for Pandemics," no. July, 2020.

[14] I. C. T. C. Repository, W. Stocktaking, R. Ict, and C. Repository, "The Coronavirus (COVID-19) Response," 2020.

[15] EBA, "Artificial Intelligence in the era of Open Banking," no. August, pp. 36–37, 2020.

[16] "INNOVATIVE APPROACHES AGAINST COVID-19."

[17] L. Wynants *et al.*, "Prediction models for diagnosis and prognosis of covid-19: Systematic review and critical appraisal," *BMJ*, vol. 369, 2020, doi: 10.1136/bmj.m1328.

[18] K. C. Santosh, "AI-Driven Tools for Coronavirus Outbreak: Need of Active Learning and Cross-Population Train/Test Models on Multitudinal/Multimodal Data," *J. Med. Syst.*, vol. 44, no. 5, pp. 1–5, 2020, doi: 10.1007/s10916-020-01562-1.

[19] U. Nations, "Exploring and Applying Motivational Theories."2020