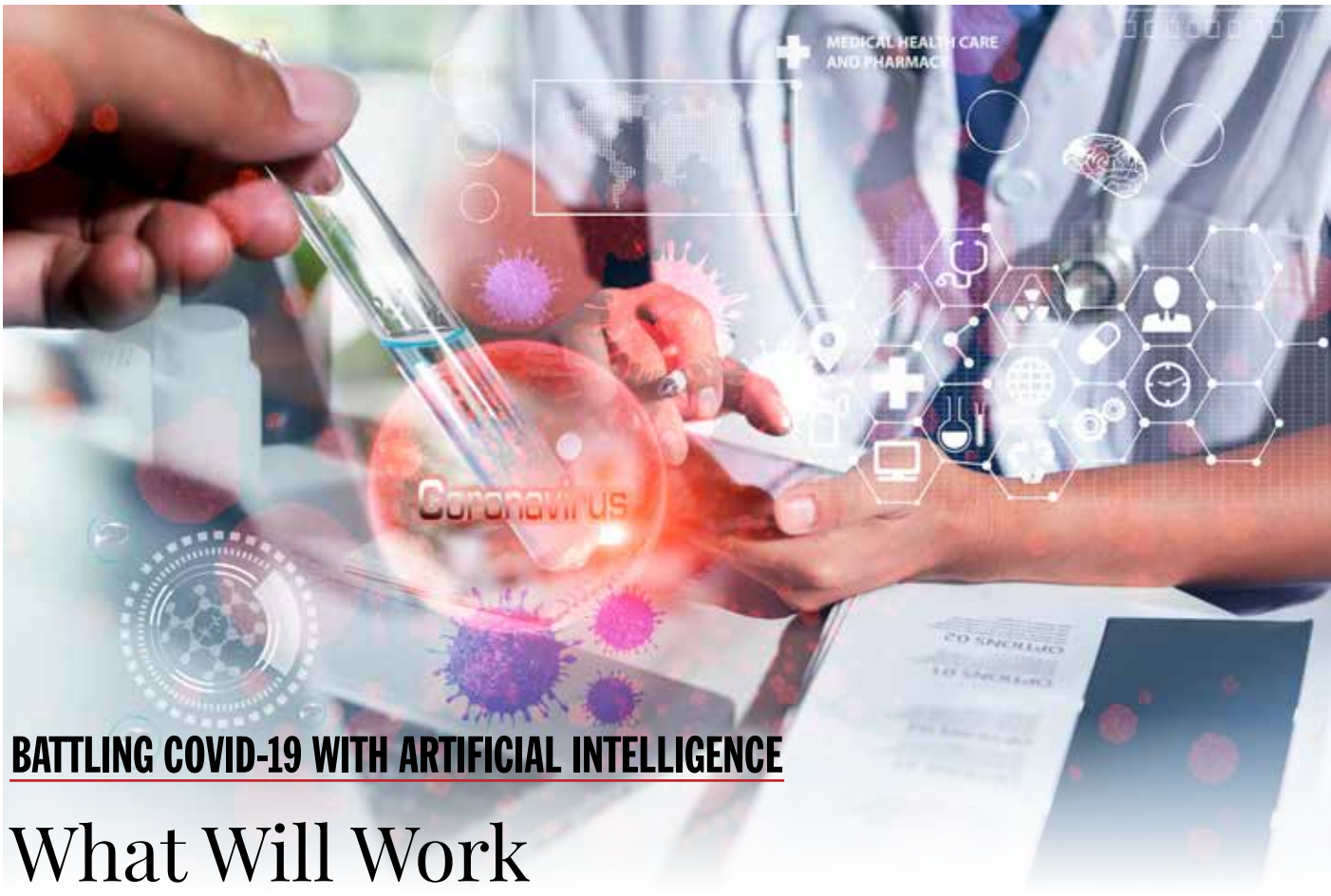

BATTLING COVID-19 WITH ARTIFICIAL INTELLIGENCE

What Will Work in Africa?

By Abejide Ade-Ibijola and Charis Harley

Can AI really help?

Many researchers and industry experts working in Artificial Intelligence (AI) have claimed that AI holds the answers to the past, present, and future difficulties faced by humankind. We form part of this group, and with the coming of Covid-19 – a pandemic which is raging through the world and has so far claimed over 300,00 lives – we argue that now is the time to combine human ingenuity with the capability of machines to support a world in crisis. It has been predicted that Covid-19 will result in a high death toll in Africa, as has been the case on other continents. Vaccines and/or a cure will take more than a year to be realised, hence the question: can we turn to technology, specifically AI, for a solution? In this article, we consider the context of Africa in particular, our specific difficulties, and how AI can help Africa in the fight against Covid-19. The goal is to curb its spread, help predict patterns of spread, support social distancing measures, help in contact tracing, and assist with reopening economies. A key point in this article is that not all AI technologies are feasible within the African context, not only because of affordability concerns, but also because of current policies and social contexts.

Mobilising AI against Covid-19

In an age where medical science has moved into the realm of what was once termed science fiction, on a continent which has long faced the ravages of disease, poverty, economic instability

and severe climate conditions, it may seem strange that another pandemic would cause such panic. After all, African medical experts have been at the forefront of medical advances for decades, and have contributed to many innovative technologies. In fact, this is South Africa's third major pandemic in only 100 years, and with a much younger population than Europe or China, African countries may in some ways be more resilient to Covid-19. The reality, however, is that Africa is vulnerable in many respects, with a constantly evolving climate, changing social constructs, and fragile economies. As such, we need new tools and methods to support our fight against Covid-19. In an age where data is gold, the use of data analytics, machine learning and AI have become prominent tools, as we will argue below.

3D printing

A simple yet extremely effective contribution to the fight against Covid-19 has been the mass production of masks. In such a manner, AI is being used to safeguard both the public and healthcare workers. The University of Johannesburg's Library Makerspace team has used 3D printing to produce surgical face shields to tackle the shortage of personal protective equipment (PPE) for healthcare workers. HP's 3D Digital Team and Digital Manufacturing Partner Network have taken 3D printing further, by designing, validating and producing essential parts for medical responders and hospitals. These include ventilator valves, breathing filters, face mask clasps, and plastic door handle adaptors that enable easy elbow opening to prevent further spread of the virus (Lores, 2020).

Budmen Industries are also at the forefront of producing 3D printed devices to support health care workers. They have developed the necessary files to print 3D Face Shields, easily downloadable from their website (Budmen Industries, 2020). A northern Italian hospital in Brescia, Italy, ran out of replacement valves for a reanimation device due to a supplier shortage. The Italian business Isinnova stepped in and printed replacement valves at short notice, saving many lives in the process. Building on this success, they then created a 3D-printed adapter that converts snorkelling masks into functional C-PAP masks for oxygen therapy, supporting the improved health of any who have severe symptoms of the virus (Sher, 2020).

> "A key point in this article is that not all AI technologies are feasible within the African context, not only because of affordability concerns, but also because of current policies and social contexts."

Curative AI

AI research has already shown itself to be at the forefront of the development of antibodies and vaccines for Covid-19, either entirely designed from scratch or through drug repurposing. For instance, the AI healthcare start-up Deargen, based in South Korea, published a paper on a deep learning-based model which assists in detecting which existing medications would work best (Marwala, 2020). Similarly, companies such as BenevolentAI, based in the United Kingdom, are using AI and available data to search through existing drugs that could be used to treat Covid-19 patients until a vaccine becomes available. Vir Biotechnology and Atomwise, start-ups in the United States, are using algorithms to identify a molecule that could serve as the basis of treatment, while the British start-up Exscienta has already been successful at presenting an AI-designed drug molecule that has gone to human trials (Obeidat, 2020).

The genetics of Covid-19 are also being investigated. Intel have teamed with Lenovo and BGI Genomics to accelerate the analysis of the genomic characteristics of Covid-19, with the aim of assisting scientists with investigating transmission patterns of the virus and creating better diagnostic methods (Swan, 2020). Using its AlphaFold system, Google's AI company DeepMind is creating structure models of proteins that have been linked with the virus in a bid to aid our understanding of it (Obeidat, 2020). Academic institutions have not been left behind when it comes to using AI to support curative research. Akara, a Trinity College spinout based in Dublin, has developed Violet, which is an ultraviolet light robot clinically proven to kill viruses, bacteria and harmful germs (Akara Robotics, 2020). OxyGEN, a device developed by the company Protofy.xyz, with the scientific support of the Hospital Clínic, Hospital Germans Trias i Pujol

and the UB of Barcelona, automates the process of manual ventilation for patients in emergency situations where not enough ventilators are available (OxyGEN Project, 2020).

Diagnostics with AI

Immediate diagnosis means that response measures such as quarantine can be employed quickly to curb further spread of the infection. An impediment to rapid diagnosis is the relative shortage of clinical expertise required to interpret diagnostic results due to the volume of cases. Markforged, in partnership with Neurophotometrics, produced Fiberflex Rayon, a 3D-printed nasopharyngeal (NP) swab for use in diagnostic testing for Covid-19. Aside from only taking minutes to make, they successfully detected the virus in all test patients, while the commercial swabs reported false negatives (Markforged, 2020). BillionToOne has developed a novel, highly accurate and cost-effective Covid-19 test protocol which, through the use of different sets of instruments and chemicals from existing Covid-19 tests, has unlocked the capacity to test more than one million patients per day in the United States alone (Newswire, 2020). Improved diagnostic time has been the aim of many innovators during the Covid-19 crisis. LinkingMed, a Beijing-based oncology data platform and medical data analysis company, employed AI to do so. Pneumonia, a common complication of Covid-19, can now be diagnosed from analysis of a CT scan in less than sixty seconds with an accuracy rate as high as 92% and a recall rate of 97% on test data sets (Obeidat, 2020).

Intelligent robots and drones

The public deployment of drones and robots for a myriad of purposes has been of great assistance, given the strict social distancing measures implemented in many countries. Simple tasks, such as room cleaning and the sterilisation of isolation wards, are now being done by robots. Pudu Technology have extended their reach to the healthcare sector by deploying their robots in over 40 hospitals for these purposes (Obeidat, 2020). DJI, a Chinese-based company, have furthered sanitation by using drones to spray a chlorine or ethyl alcohol-based disinfectant from the air (DJI Hub, 2020).

Drones are also being used for effective communication in China. Loudspeakers have been mounted on drones to help disperse public gatherings in crowded places, AI voice assistants advise people to adhere to quarantines, and drones flying banners give instructions on necessary precautions. The AI voice robot is further capable of obtaining personal information to produce daily reports which have helped to monitor the spread of the virus in China. Thermal cameras on drones have assisted in a similar fashion by monitoring body temperature so that medical staff can identify new potential cases (DJI Hub, 2020).

Intel has had similar success, providing robots to assist medical professionals by transporting medical supplies and surgical equipment to reduce human-to-human interactions (Swan, 2020). Autonomous delivery is being extensively used in more than one country by companies such as Antwork, JD Logistics, MicroMultiCopter and Zipline (Obeidat, 2020).

Communication and misinformation

The panic and uncertainty which has engulfed the world has naturally led to the dissemination of false information, leading to myths on many social media and news platforms. Several organisations have started combatting concerns surrounding misinformation, such as Kaleyra who have launched a program aimed at facilitating communication with populations affected by Covid-19. They assist organisations to communicate through their application programming interfaces (APIs), whether via SMS, voice or WhatsApp services. In South Africa, a digital platform called GovChat acts as a notification service which connects citizens to government services through mobile phones (Marwala, 2020). It also serves to alert healthcare authorities of possibly infected individuals and to direct people to suitable medical facilities. In a similar vein, a Ghanaian e-health medical diagnostics distributor, Redbird, has launched a Covid-19 Daily Check-in App and Symptom Tracker which allows users to report symptoms and enables pharmacists to track the results of their customers (Jackson, 2020). In this manner, they are not only supporting effective communication between the public and healthcare practitioners, but are also ensuring social distancing.

A tide of phishing, misinformation and

malware has also hit platforms such as Google and Facebook, who have developed a method where a search for coronavirus/Covid-19 yields an alert sign coupled with links to verified sources of information. YouTube directly links users to the World Health Organisation (WHO) and similar credible organisations, while removing inaccurate or untrustworthy videos. In an attempt to obtain more accurate data, certain companies are trying to leverage different means of surveillance. Canadian-based BlueDot have employed machine learning and natural language processing to track, recognise, and report the spread of the virus, and have been able to do so faster than the WHO or the US Centre for Disease Control and Prevention (CDC) (Obeidat, 2020).

Challenges in Africa

While the outbreak of a communicable disease is not foreign to many in Africa, Covid-19 is still novel in many respects. With an eye on the rest of the world, Africa has had to assess an ever-evolving situation with a keen awareness of the fact that an outbreak on this continent will look different to other parts of the world.

Aside from our specific economic, geographical and societal contexts, we must also take into account our demographics. To date, the pandemic has consistently targeted the elderly, with people over the age of 60 accounting for 81% of all infection-related deaths, according to the WHO. With a relatively young population, such individuals make up approximately 5% of our population, in comparison to 16% in China (Dupoux et al, 2020).

While this should alleviate some concerns regarding the safety of our young adults and children, we still face the difficultly of having many vulnerable individuals in our society. A significant number of adults in Africa have compromised immune systems, mostly owing to the high prevalence of HIV infection and HIV-tuberculosis co-infection. Data on the fatality rate of immunocompromised Covid-19 patients is limited, but early data indicates that the rate for individuals with certain chronic medical conditions is up to five times higher than the overall case fatality rate (Dupoux et al, 2020).

Healthcare systems

It is well-known that the capacity of healthcare systems in most parts of Africa is limited. Recent data indicates that Ethiopia and Niger each have 0.3 beds per 1,000 people, and Tunisia has 2.3, compared to an average of 5.6 in Europe (Dupoux et al, 2020). Furthermore, we have constrained tertiary care capabilities, and limited critical care units and medical supplies. If healthcare systems in the region were to become overwhelmed, support for Covid-19 patients would falter, the deaths among patients with other illnesses could spike, and other types of public health measures would be under severe strain.

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Another risk of fighting the Covid-19 outbreak is the possible distraction for healthcare systems which need to also be concerned with other diseases, including malaria and measles (Vaughan, 2020). The 2014–16 Ebola outbreak led to many thousands of deaths, not due to the outbreak itself, but rather as a consequence of resources being diverted away from other diseases. Should healthcare systems across Africa falter in a similar way, citizens are likely to develop distrust in these systems, which could contribute to the spread of the disease (Dupoux et al, 2020).

Economies

Covid-19 will undoubtedly have a negative impact on African economies. This will lead to revenue declines or possible closures for small businesses and even larger companies. Citizens will face job losses and reduced wages as companies lay off workers, with the most immediate impact visible for those in the informal economy.

Companies and governments are likely to face shortages of cash flow and working capital. This would have an immediate effect on governments’ liquidity, their ability to pay workers, to build infrastructure, to provide supplies needed by emergency response teams, and to initiate economic stimulus packages to mitigate serious

economic downturns. Several African countries have already implemented lockdowns, so these liquidity issues could surface quickly (Dupoux et al, 2020).

Society

Mitigating strategies that may have worked in other countries will not necessarily be effective in African cities, particularly in tightly packed informal settlements. Furthermore, even where people are relatively dispersed in rural areas, communicating information about social distancing and necessary sanitation measures will be challenging, if not impossible.

Such obvious social inequity is an immediate concern, effectively highlighting those that are more vulnerable than others. Many people in Africa survive on daily wages, which under lockdown conditions or enforced social distancing will lead to a loss of income (Dupoux et al, 2020). Reduced wages and an increase in unemployment, especially for those in the informal sector, will lead to increased levels of poverty, a lack of basic necessities, and malnutrition, which in turn will make people even more susceptible to Covid-19. The closing of schools contributes to this, since school-based nutrition programs for children will be disrupted.

While governments are trying to put measures in place to support the well-being of the public, these measures are also placing economic and emotional pressure on individuals. As the stresses and strains faced by the family unit increase, we will see a breakdown of community cohesiveness, especially with the banning of social events in many countries. At the same time, the spread of misinformation will inevitably lead to unrest and crime, as people grow more desperate and fearful.

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AI ingenuity in Africa

In this section, we explore how AI solutions can be implemented in the fight against Covid-19 in Africa. We begin by discussing AI solutions that are currently being deployed around the world and highlight the ones that can be ‘ported’, or replicated, in Africa. We also discuss a number of current efforts in African countries that suggest that AI is already being implemented in the fight against Covid-19 in Africa. Finally, we explore how new AI initiatives (or models) can be built to address Africa’s specific needs, and the challenges of such a pursuit (mainly related to data quality), despite the recorded successes of AI in Africa during this pandemic.

Existing solutions that can be ‘ported’ to Africa

Below, we present various solutions developed via AI which have assisted in combating Covid-19 around the world, as well as discussions on whether these same solutions can be ‘ported’ to Africa.

Case identification from surveys – Researchers at Cambridge University have proposed a machine learning technique that analyses surveys obtained from mobile and web apps, while cities and towns are under quarantine (Srinivasa and Vazquez, 2020). This solution can easily be developed and employed across African countries with the limitation of reaching only major metropolitan areas, as Africa has many remote and rural areas that will not be able to access such apps.

Case identification from X-ray images – In Australia, AI experts have built an AI model for the automatic detection of Covid-19 from X-ray images, using Deep Learning (a class of machine learning algorithm). This AI model took previous advancements in computer vision, and – using a smaller set of labelled X-ray images – was able to learn and tell (to a high degree of accuracy) whether a new X-ray image was that of a Covid-19 patient (Apostolopoulos and Mpesiana, 2020). A similar attempt to this, also based on Deep Learning, can be found in Wang et al (2020). In the case of this innovation, there is really no need to reinvent the wheel: a representative of an African country (from government, public, or private healthcare) interested in using this tool can just write to the inventors for a license to use the solution. Such tools are currently being shared for free across the world as solidarity gestures against this pandemic.

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a) *Case identification and outbreak risk analysis* – A tool called BlueDot uses machine learning (cluster analysis) for case identification and to predict the spread of diseases. This tool uses a dashboard to present users with a global tracking of risks and contexts of the disease. BlueDot is a commercial tool, hence within the context of Africa it has limited use: an entity may buy a license, or write to the inventors to use this tool for social good. It is unknown whether the analytics provided by this tool are based on data collected on the African continent – were this not the case it may significantly skew the tool’s predictions, or at the very least skew them slightly, due to the inaccuracy of African datasets.

b) *Management of critical patients* – In the United States, AI (Deep Learning and Expert Systems) has been employed to support decision making concerning Covid-19 patients in ICU. This AI has shown good results in offering diagnosis, treatment risk stratification, prognosis and management (Alimadadi et al, 2020). Implementing a similar solution in Africa will require large, quality datasets from the continent. The challenges of getting these types of datasets is discussed below.

c) *Drug synthesis* – Evidence has shown that machine learning and Natural Language Processing techniques have found applications in drug synthesis by learning the structural comparison of protein binding (Simonovsky and Meyers, 2020). This technology is currently being used in the quest to find treatment for Covid-19. African researchers in related domains are most likely looking at similar works and using these as building blocks in the race for finding a cure to this virus.

d) *Tracking of social distancing and face masks* – Reuters News Agency recently reported that a number of companies in the USA are now using cameras (equipped with computer vision algorithms) to track people’s compliance with social distancing in their environment, including compliance with other regulations such as wearing face masks (Reuters, 2020). These solutions can be purchased ‘out of the box’ by the administration of interested African countries – there is no need to reinvent this.

e) *Enforcing social distancing with drones* – This solution uses drones to provide insights to law enforcement agencies on where people may currently be gathered. This helps with the optimal deployment of policing resources to enforce social distancing (Rivas, 2020). This may be in violation of privacy laws in some countries, but it is currently being used in Peru. Drones have shown their usefulness in rural areas of Africa, so this solution may be considered viable (as a complement to other efforts) by some countries in Africa.

f) *Drones for humanitarian aid distribution* – China has used drones for the distribution of humanitarian aid and medical supplies, as well as for aerial monitoring and the estimation of the magnitude of spread (Ruiz Estrada, 2020). Using drones to deliver supplies to remote areas in Africa is not new. One such innovation can be found in Rwanda’s Zipline drone program, in which blood supplies are delivered to remote areas.

g) *3D printing of protective equipment* – Many manufacturers across the globe are using 3D printing to manufacture protective equipment, such as masks, face shields, Covid-19 specimen collection kits, ventilator valves and medications (Ishack and Lipner, 2020). Some African countries have made similar efforts, as has been discussed earlier in this article.

h) *Community risk assessment* – The alpha satellite (□-satellite) is an example of AI that is currently being used to assess the risk of communities in the USA in order to help with developing strategies for combating the pandemic (Ye et al, 2020).

Africa’s successes in fighting Covid-19 with AI

In this section, we discuss examples of how AI is being used in African countries to assist in combatting Covid-19. This is by no means an

exhaustive list, and there may be many more attempts that are not included here.

a) Ghana –

An app for comprehensive real-time tracking of Covid-19 cases across Africa was launched in Ghana. This app is based on AI4COVID-19 by Runmila AI Institutes and MinoHealth AI labs (Paul, 2020). Another work in progress reported in Ghana is the work of Amo-Boateng, which is a testing unit powered with a mobile phone, capable of producing a result in less than a minute. The AI community is keeping an eye on this development (Tsado, 2020; Paul, 2020).

b) Kenya –

Tambua Health, a Kenyan start-up, has reported a tool called T-sensem. This tool records sounds from the lungs and the heart and attempts to determine if there is a respiratory disease in the body. It is currently at an experimental stage (Paul, 2020).

c) Nigeria –

Beat Drone, a Nigerian start-up, has shown promising experiments in the spraying of disinfectants to fight Covid-19 using drones (Jackson, 2020). Wellvis Health Nigeria has also launched an app that allows users to evaluate their Covid-19 risk categories based on their symptoms and history of exposure. This is a rule-based type of AI system (Paul, 2020).

d) South Africa –

The University of Johannesburg's Library Makerspace is employing 3D printing for the creation of PPE, including face shields, which are donated to health workers in Johannesburg (Zama, 2020). Similarly, Natalie Raphil – founder of Robots Can Think – is using 3D printing to manufacture a hundred masks per day, which are then distributed to major hospitals in Johannesburg (Tsado, 2020). Drones have also proved helpful in spreading awareness messages about Covid-19 in rural areas of South Africa (De Klerk, 2020).

e) Uganda –

A noteworthy Ugandan innovation – even though it does not employ AI tools – is the Market Garden App. This app allows vendors to carry out commercial activities in a lockdown environment, while observing social distancing. The app is free, helping Ugandans to deal with the economic issues that arise from the lockdown, as some businesses are able to transact via the app, assisting entrepreneurs to keep afloat (Harrisberg, 2020).

“More can be done in Africa to build AI predictive models, as we have both the academic and technological expertise to do so. One major challenge, however, is the difficulty of obtaining the large and reliable datasets required to build such AI models.”

More can be done in Africa to build AI predictive models, as we have both the academic and technological expertise to do so. One major challenge, however, is the difficulty of obtaining the large and reliable datasets required to build such AI models. In the next section, we discuss the challenge of incomplete datasets, due to instances such as unreported cases of Covid-19 infections and deaths across African countries.

Building new AI models, and the challenges of skewed and incomplete African data

Given the rate of Covid-19 testing in African countries, it is evident that most of these countries do not have the ability to conduct extensive testing, which has led to skewed and incomplete data on the continent. According to Worldometer's statistics on Covid-19 – as at 2 May 2020 – out of 56 affected African countries and territories, only 38 have complete data fields for the number of tests completed and infected cases, while the rest do not (Worldometer, 2020). There is also a great discrepancy in the reported data for these countries, as is reflected below in Table 1.

Some countries appear to have done a lot of testing. However, if we compare the number of tests to the number of cases, we can see that not nearly enough testing is being performed. One way to assess this is to compute testing intensity. The question is: How rigorous is testing in a given country? If the number of tests completed is significantly higher than the number of infected cases, then we can say that a country is doing well

Table 1: Testing Intensity in African countries as at 2 May 2020

Country	Total Cases	Total Deaths	Total Tests	Testing Intensity (%)
Uganda	85.00	0.00	33,818.00	99.75
Botswana	23.00	1.00	7,675.00	99.70
Zimbabwe	34.00	4.00	7,642.00	99.56
Ethiopia	133.00	3.00	20,770.00	99.36
Mauritania	8.00	1.00	1,032.00	99.22
Togo	123.00	9.00	7,100.00	98.27
Kenya	411.00	21.00	21,702.00	98.11
Ghana	2,169.00	18.00	113,497.00	98.09
Mauritius	332.00	10.00	16,028.00	97.93
Zambia	119.00	3.00	5,284.00	97.75
Rwanda	249.00	0.00	10,969.00	97.73
Namibia	16.00	0.00	704.00	97.73
South Africa	5,951.00	116.00	217,522.00	97.26
Gambia	12.00	1.00	401.00	97.01
Libya	63.00	3.00	1,949.00	96.77
Mozambique	79.00	0.00	2,246.00	96.48
South Sudan	45.00	0.00	1,247.00	96.39
Burundi	11.00	1.00	284.00	96.13
Madagascar	135.00	0.00	3,393.00	96.02
Tunisia	998.00	41.00	23,526.00	95.76
Malawi	37.00	3.00	831.00	95.55
Angola	30.00	2.00	481.00	93.76
Egypt	5,895.00	406.00	90,000.00	93.45
Djibouti	1,112.00	2.00	13,856.00	91.97
Morocco	4,687.00	172.00	38,102.00	87.70
Ivory Coast	1,333.00	15.00	10,073.00	86.77
Nigeria	2,170.00	68.00	15,759.00	86.23
Niger	728.00	33.00	5,230.00	86.08
Eswatini	108.00	1.00	714.00	84.87
Cabo Verde	122.00	1.00	791.00	84.58
Guinea-Bissau	257.00	1.00	1,500.00	82.87
Mayotte	539.00	4.00	3,000.00	82.03
Mali	508.00	26.00	2,172.00	76.61
Equatorial Guinea	315.00	1.00	854.00	63.11
Gabon	276.00	3.00	724.00	61.88
Algeria	4,154.00	453.00	6,500.00	36.09
Sao Tome and Principe	16.00	1.00	19.00	15.79

in terms of testing. We compute testing intensity as follows: Testing Intensity = 1 – (Total Cases/Total Tests) x 100.

In Table 1, we present 38 African countries who have complete numbers for tests completed and infected cases, as published by Worldometer, as at 2 May 2020. We have sorted this table according to the computed testing intensity in these countries, from the most intense to the least. Countries such as Uganda, Botswana, Zimbabwe and Ethiopia have very high testing intensity rates and have carried out a significant number of tests in comparison to their number of confirmed cases. We can also observe countries that may consider performing more tests, such as Egypt, South Africa, Morocco, and Algeria.

As can be seen, creating a model via AI tools which is expected to predict the spread of Covid-19 in Africa is extremely challenging, simply because the current data from African countries is skewed and not a true representation of the situation on the ground. Most rural areas do not have access to testing kits, there is a huge backlog at testing facilities (i.e. new numbers are reports of old tests and not of new tests), and deaths are not reported in most communities, especially when the deceased have to be buried unceremoniously (Saba, 2020).

Given the circumstances, lockdowns have proven to help in curbing the spread of Covid-19. However, economies have to reopen and many experts have proposed stages so that this can be done gradually. In the next section, we discuss components of reopening plans from around the world, and propose how AI can assist in the reopening process in Africa.

Reopening strategies with AI: what can Africa afford?

In this section, we recommend a reopening plan and present ways in which AI can assist African countries during this gradual process, especially in cases where there has been a lockdown. We also elaborate on various mitigation strategies, and areas where further efforts could be focused to support the effective reopening of African economies.

The reopening of economies is one of the most talked-about and controversial topics of the present moment, especially in countries with high Covid-19 infection rates. In the USA, the Governor of New York, Andrew Cuomo, has presented a four-stage plan that was crafted using a risk versus reward analysis. This analysis placed activities and businesses that have a low risk of spreading the virus, but greater economic impact, as the first to reopen during the first stage of the plan. Those

with a high infection risk, but with low economic impact, were placed at the tail end of the reopening plan, as seen below:

Phase 1 – Construction, Manufacturing and Wholesale Supply Chain
Phase 2 – Professional Services, Finance and Insurance, Retail, Administrative Support, Real Estate/Rental and Leasing
Phase 3 – Restaurants, Food Services, Hotels and Accommodations
Phase 4 – Arts, Entertainment/Recreation, Education

The mitigation strategies are: wearing of masks, washing of hands, weekly testing (where the resources exist), and social distancing. We have singled out this reopening plan, since it is well- thought-out, takes into account basic yet fundamental safety measures which each individual can employ, and can work in Africa. The following are ways that AI can assist with mitigation strategies:

Social distancing – As has been discussed, drones have been used successfully in other parts of the world for the monitoring of public spaces. This can be adopted in Africa, as these drones are mostly available 'in a box' or 'off the shelf'. Piloting them is relatively easy, and they can also be used as a means of supplying humanitarian aid to rural African villages and towns.

Face masks – South Africa is already using 3D printing to create face masks, shields and PPE. This idea can be replicated by other African countries. Face masks can also be made locally and affordably by using recommended fabrics.

Rapid testing – AI tools can be used to identify infected cases, which will assist in deploying testing resources to the sectors of the population who are most likely to be infected.

Predictive models – While it is important for researchers and industry experts to keep building machine learning models that can predict the spread of the virus, we must emphasise that these models are limited by the credibility of the data which can be obtained. Most models will be inaccurate, due to the issues discussed earlier in this article. Hence, we advise that these efforts be used to further more productive ventures.

Online learning – A fundamental consideration across the globe is how to manage the education of our youth during the current crisis. There exist a host of free online tools and applications available to support teacher engagement with students. Companies such as Intel are also working towards technological solutions for virtual learning (Swan, 2020). Plagiarism checkers are easily available, and facial recognition software (designed with machine learning tools) is able to assess the person's identity (via an uploaded ID document) and then repeatedly monitor their presence during assessments.

It is important to note that many software vendors around the world (including vendors of AI products and tools) are currently giving out free licenses to help in the fight against Covid-19. African countries can apply for these licenses, which will provide them with access to technologies that normally would have been inaccessible due to the associated costs.

What is the way forward for Africa?

African governments currently find themselves in a situation where they have to weigh the health of their people against safeguarding their countries' economies. The consequences of not seeing to the latter will be increased levels of poverty and worsening social conditions. One thing is certain: any assistance will be appreciated – even if it comes from machines.

In this article, we have discussed how AI efforts around the world are providing tools to mitigate the spread of Covid-19. More can be done, and on a much larger scale, and it is to this end that we have provided a list of AI technologies that can be 'ported' to Africa. We have also discussed the issue of skewed data on the continent, which will limit the effectiveness of AI models built for the sole purpose of predicting the spread of the virus in

"African governments currently find themselves in a situation where they have to weigh the health of their people against safeguarding their countries' economies. The consequences of not seeing to the latter will be increased levels of poverty and worsening social conditions. One thing is certain: any assistance will be appreciated – even if it comes from machines."

Africa. This is not to say that one may not pursue such ventures, but there needs to be an awareness of the degree of error involved in basing models on incomplete data. Fundamentally, it would not be feasible to make decisions based on unreliable results.

The question which invariably lingers in our minds is: How will Africa pay for these suggested technologies? Most of the countries in question may not have the budget to invest in AI technologies and tools. Hence, we call on the private sector to use this crisis as an opportunity to make themselves known through investing in the public. The private technology sector is capable of funding drones and sponsoring research into solutions of the kind discussed here. Such efforts would not go unnoticed by a government and the people it would benefit. Rather, it would serve to highlight those organisations who acted to support their clients during a time that has left many in dire straits.

The governments of African countries should engage in discussions with experts regarding the pandemic we face, and the concerns which surround it. South Africa has a Presidential Commission on the Fourth Industrial Revolution, consisting of academics, industrial experts, and government officials who promote AI agendas. Many other countries on the continent could also benefit from such a panel, and as such should take South Africa's lead, if they have not already done so. ■

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