Applications of Artificial Intelligence (AI) in COVID-19 Pandemic

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Abstract

Over the past few months, several works have been published regarding the flexibility and pre-discovery of COVID-19 with mathematical model and Artificial intelligence (AI). The rapid review of the literature is completed on the database of Pubmed, Scopus and Google Scholar using the keyword of COVID-19 or Coronavirus and Artificial intelligence or AI. Collected the latest information regarding AI for COVID-19, then analyzed an equivalent to spot its possible application for this disease. We have identified seven important AI programs for COVID-19 disease. This technology plays an important role in finding cases and predicting the future of the virus by collecting and analyzing all previous data. Healthcare organizations are in dire need of management decision-making technology this virus also helps them to get proper advice in real time to prevent its spread. AI works on an intriguing way of imitating as human ingenuity. It can also play an important role in understanding as well promotes the development of COVID-19 injection. This result-driven technology is used appropriately testing, analysis, prediction and follow-up of current and future patients. Important applications are used to track the data of certified, found and killed cases.

Keywords: COVID-19, Pandemic, Artificial Intelligence,

1. Introduction

The WHO declared the Chinese outbreak of COVID-19 to be a Public Health Emergency of International Concern posing a high risk to countries with vulnerable health systems on 30th January 2020 (Sohrabi2020). By then there total number of confirmed cases were 7818 of COVID-19 worldwide with 1370 severe cases and 170 deaths (20200130-sitrep-10-ncov). In a few weeks the disease has procreated across the boundaries of China infecting nearby country. While writing the paper (08 August 2020) there is a total 19.3 million confirmed gases worldwide and 719 thousand deaths. In India 2.09 million confirmed cases with 42,518 deaths. Elaborating on the nature of COVID-19, Bhargava said 20 percent of those infected may show symptoms like cough, cold and fever. Of this, only 5 percent require hospitalization showing severe symptoms. Some of the symptoms include difficulty in breathing, fever and coughing and it could be fatal as well. Many of the people who died reported to have an advanced age, hypertension, diabetes or cardiovascular disease/s that impaired their immune systems. The WHO recommends washing your hands regularly, covering your mouth and nose when you cough / stitch, and avoiding contact with anyone who shows signs of respiratory illness. Following the declaration of an emergency to the WHO, a number of activities were undertaken to predict the model and provide ways to understand the spread of the disease, to evaluate preventive measures implemented by authorities, to provide rapid and accurate diagnosis. A mathematical model such as artificial learning that has been used for several years in the early stages of any disease (nokes1998). Mathematical modeling of disease transmission and propagation helps in prediction course of the epidemic, the design of mass vaccination programs and also how they can provide guidance Data are relevant in epidemic studies and also it can provide guidance on what type of data are relevant in the study of the epidemics (Kruijshaar2002). Some studies done in relation to the present COVID-19 involves modelling the dynamic of COVID-19, exploring the effect of prevention method like travel restriction of COVID-19 and study of climate impact on broadcast of COVID-19 (Wynants2020). Artificial intelligence (AI), on the other hand, sometimes called machine intelligence, is a machine-made intelligence, in contrast to the natural intelligence shown by humans and animals. AI has been used successfully in a number of fields such as computer vision, online advertising, spam filtering, robots, fraud detection and so on. In healthcare, now a days AI has also attracted attention such as disease detection, treatment selection, patient monitoring, drug discovery, gene function annotation, automated experiments, automated data collection etc. (Yu2018, Jiang2017). In COVID-19 the use of AI has been used in a variety of areas such as the acquisition of AI-enabled image acquisition can greatly assist in advancing the scanning process and also reshape the workflow with minimal contact to patients, providing the better protection to the imaging technicians. Also, AI can improve work efficiency by accurately diagnosing X-ray images and CT images, facilitating subsequent quantification (Shi2020). In this review paper, we tried to explain the uses of mathematical modelling and artificial intelligence in estimation and prediction of COVID -19 in present conditions.

2. Mathematical modelling COVID-19

Various research works have been developed in literature for the modelling of dynamics and spread of COVID-19. The most notably deterministic mathematical models include susceptible-infectious-recovered (SIR), susceptible-infectious-susceptible (SIS), and susceptible-exposed-infectious-susceptible (SEIS) models. These models were largely used in the past for the study of epidemic spreading with various forms of networks of transmission (Wang2020).

2.1 Susceptible-exposed-infected removed (SEIR)

Zhan *et al*., combines daily migration data with the old SEIR model to form a new appropriate model to describe the potential spread of Coronavirus Disease 2019 (COVID-19) in China. They collected migration data for 367 cities in China from a mobile app based human migration tracking data system. They have shown that the number of infections in most China cities would be very high between mid-February and early March 2020 (Zhan2020). At John Hopkins University data was collected, changes in the spreading pattern of COVID-19 in collected data was analyzed and predicted with the help of two types of machine learning SEIR and regression model (Gupta2020). The study presented in Prem2020 used a systematic age-based approach based on a few steps of physical movement and its assessment. Another study examined the presence of infectious disease and analyzed its relationship to heat and humidity, in order to put forward suggestions on how to suppress transmission (Guo2020).

In another study developed the SEIR model of transmission capacity to detect the potential social impact of face mask use, with greater diligence and compliance, in transmission modification and control of the COVID-19 pandemic. They suggested that the use of face masks by the general public could be too costly to reduce public mobility and the burden of the pandemic. The benefits to the general public are likely to be greater if the face mask is used in conjunction with other non-medical items (such as public transfers), and where the acquisition is almost universal (national) and compliance is high (Eikenberry2020).

2.2 Susceptible infected recovered (SIR)

A time-dependent SIR model that tracks two time series the transmission rate and the recovery rate was proposed in chen2020. They showed that the one-day errors of verified case numbers are almost less than 3%. Also, the conversion site, defined as the date when the transfer rate is below the recovery rate, is estimated to be February 17, 2020 (Chen2020). In some studies researchers have modified the SIR model to include a variety of time-sharing contracts, including major isolation policies and low-level community screening programs. The SIR model was also used to fit the cumulative data of COVID-19 to an empirical form in China (Wang lili 2020, Biswas2020). In another study researcher used a simple SIR-like epidemic model similar to SIR that incorporates age-related communication patterns in the United States to illustrate the strategic effect of age-specific epidemic attacks on COVID-19-

like epidemics. They concluded that, among the strategies that end with human immunization, age-reduction strategies could significantly reduce mortality and the use of the ICU in choosing a natural environment (Chikina2020). The age-structured SIR model with social contact matrices obtained from surveys and Bayesian imputation was studies to evaluate the progress of the COVID-19 epidemic in India (Singh2020). Authors investigated the impact of social distancing measures - workplace non-attendance, school closure and lockdown - and their efficacy with duration on the spread of CORONA virus cases. They suggested that a three-week lockdown would be found insufficient to prevent a resurgence and, instead, protocols of sustained lockdown with periodic relaxation (Singh2020). The new version is a simple model of the SIR type, which includes some characteristic variables of the containment measures that have been taken worldwide (González2020). By comparing various scenarios, it was shown that the infection progress strongly affected by the measures taken.

3. Artificial intelligence and COVID-19 outbreak

Artificial intelligence (AI) has been widely used for imaging and treatment to differentiate whether a patient has COVID-19 or any other severity of infection. The images used in these works were mainly from X-ray radiology or Computed Tomography (CT). Before presenting the AI methodologies used in COVID- 19 detection and classification, a brief description of these medical imaging modalities is presented.

3.1 AI technology in SARS-CoV-2 screening and treatment

Early detection of any disease is it infectious and non- infectious, is critically an important task for early treatment to save more lives. Medical considerations such as X-ray and computer tomography (CT) play an important role in the global fight against COVID-19, and the emerging artificial intelligence (AI) technology strengthens the power of imaging tools and assists medical professionals. AI-enabled image detection can greatly aid the scanning process and also create a workflow with minimal communication with patients, providing better protection for psychologists. Also, AI can improve work efficiency by accurate delineation of infections in X-ray, CT images and clinical blood samples, facilitating subsequent quantification. Moreover, the computer-aided platforms help radiologists make clinical decisions, i.e., for disease diagnosis, tracking, and prognosis (Shi2020). In this regard, Table 1 shows selective information on diagnosis and screening proposed for the Coronavirus disease. In this context studies Ardakani et al., 2020 suggested that an artificial intelligence technique based a rapid and valid method for COVID-19 diagnosis. Among various networks, the best performance was achieved by ResNet-101. ResNet-101 could distinguish COVID-19 from non-COVID-19 cases with an AUC of 0.994 (sensitivity, 100%; specificity, 99.02%; accuracy, 99.51%). Another study proposed a deep learning based model to detect and classify COVID-19 cases from X-ray images. This model is fully utilized with the end structure without the need for manual removal. Their advanced system is capable of performing binary and multi-stage operations with an accuracy of 98.08% and 87.02%, respectively. The DarkNet model was used in their study as a classifier for you only look once (YOLO) real time object detection system (Ozturk2020).

Furthermore, researchers have found four important medical features combinations of clinical, laboratory features, and demographic information for discriminating the mild and severe/critical cases using GHS, CD3 percentage, total protein, and patient age employing Support Vector Machine as the primary feature classification model (Sun2020). The four-dimensional SVM model is robust and effective in predicting critical / critical patients and the results show that the combination of these four factors includes AUROC of 0.9996 and 0.9757 in training and testing datasets respectively. Cox multivariate regression analysis and survival revealed that the model strongly discriminates against serious / critical cases and uses the information of selected clinical indicators (Sun2020). After evaluating 253 clinical blood samples from Wuhan, researchers found eleven (bilirubin total, creatine kinase isoenzyme, GLU, creatinine, kalium, lactate dehydrogenase, platelet distribution width, calcium, basophil, total protein, and magnesium) suitable indicators which can help as a discrimination tool of Covid-19 for healthcare expert toward rapid diagnosis. In this study, 11 key blood indicators were obtained through random forest algorithm to create the final auxiliary discrimination tool from 49 clinical available blood test data obtained by commercial blood test equipment’s with an overall accuracy of 0.9512, 0.9697, and 0.9595, respectively (Wu2020). The above studies give the evidence of an application of the expert system; designing rapid diagnosis was the main objective along with augmentation of accuracy (Jain2022).

Table-1 ML and AL technology in COVID-19 Screening

Publication	ML/AI method	Types of data	No of patients	Validation method	Sample size	Accuracy
Wang, L. *et al*., (1)	COVID-Net Computer neural network	Clinical CXR images	13,870	Explainability-driven audit	COVIDx dataset contains 358 CXR images from 266 COVID-19 patient cases, 8,066 patient cases who have no pneumonia, 5,538 patient cases who have non-COVID19 pneumonia	92.6%
Narin, A. *et al*., (2)	ResNet50 ; InceptionV3 ; Inception-ResNetV2 Computer neural network	Clinical CXR images	50	5-fold cross validation	50 CXR images of COVID-19 and 50 CXR images of Pneumonia patients	98% ; 97% ; 87%
Li, L. *et al*., (3)	COVID-net computer neural network	Clinical CT images	3322	Internal validation	1296 patients of COVID-19, 1735 of CAP and 1325 of non- pneumonia	87%
Ioannis, D. *et al*., (4)	Deep learning with X-ray	Clinical CXR images	448	Tenfold-cross validation	224 images of Covid-19 disease, 700 images of common bacterial pneumonia, and 504 images of normal conditions	96.78%
Hemdan, E.E.D. *et al*., (5)	COVIDX-Net (VGG19 and DenseNet201) CNN	Clinical CXR images	25	Cross validation	Chest X-ray images of 25 normal and 25 COVID-19 positive cases	90%
Barstugan, M. *et al*., (6)	Support vector machine learning	CT abdominal images	53	Tenfold-cross validation	150 CT abdominal images of 53 infected patients	90%
Sethy, P.K. *et al*., (7)	ResNet50 and Support vector machine learning	Clinical CXR images	50	Internal validation	25 CXR images of COVID-19 positive and 25 CXR images of COVID-19 negative cases	95.38%
Batista, A.F.M. *et al*., (8)	Random forests and Support	Clinical blood samples	235	Tenfold-cross validation	102 patients COVID-19 positive with 15 variables	84.7 %

	vector machine learning					
Mahdy, L.N. *et al.*, (9)	Multi-level thresholding plus SVM	Clinical CXR images	40	Internal and external validation	15 lungs images of normal and 25 lungs images of infected and COVID-19 positive cases	97.48%
Li, K. *et al.*, (10)	Logistic Regression	Clinical CT images	83	Internal validation	83 patients with COVID-19 pneumonia including 25 severe/critical cases and 58 ordinary cases	97%
Kumar, R. *et al.*, (11)	Synthetic minority oversampling technique (SMOTE)	Clinical CXR images	88	Cross-validation	5840 images were used with 5216 images for training (1341 for Normal class and 3875 for Pneumonia class) with the remaining 624 (234 for Normal class and 390 for Pneumonia class) in testing	96.6%
Farid, A.A. *et al.*, (12)	Naive Bayes (NB) machine learning	Clinical CT images	51	Tenfold-cross validation	51 images each segregated into the severity of SARS and coronavirus	99.4%
Wang, C. *et al.*, (13)	NLR&RD W-SD	RTPCR	45	Cross validation	45 patients with COVID-19 (35 moderate and 10 severe cases)	85.7%
Tang, Z. *et al.*, (14)	Random forest based model	Clinical Chest CT images	176	Threefold-cross validation	176 patients, 121 were identified as non-severe, and 55 were severe from COVID-19	87.5%
Shi, F. *et al.*, (15)	Infection size-aware random forest (iSARF) model	Clinical CT images	2785	Fivefold-cross validation	1658 cases were from confirmed COVID-19 and 1027 cases were CAP patients	87.9%
Chen, X. *et al.*, (16)	Modified U-Net structure	Clinical CT images	60	Tenfold-cross validation	110 axial CT images of COVId-19 patients	79%
Fang, X. *et al.*, (18)	Radiomics nomogram	Clinical CXR images	239	Tenfold-cross validation	136 patients with COVID-19 pneumonia and 103	79.3%

					patients with other types of viral pneumonia	
Ni, Q. *et al*., (19)	Deep learning algorhithm	Clinical CT images	14,435	Cross validation	19291 CT scans , 2154 cases were COVID-19 positive and while 5874 patients cases pulmonary pneumonia	73%
Brunese, L. *et al*., (20)	Deep learning algorhithm	Clinical CXR images	6523	Cross validation	250 cases were COVID-19 positive, 2,753 cases were pulmonary diseases and 3,520 cases were healthy patients	97%

3.2 AI technology in vaccination and drugs of COVID-19

The COVID-19 pandemic is taking a heavy toll in human suffering and lives. A significant amount of new scientific research and data sharing is underway due to the pandemic which is still rapidly spreading. There is now a growing number of published papers related to coronavirus data to be conducted and artificial intelligence (AI) to fight the disease by driving new cases of drug availability, vaccine development, and public awareness. AI can be used to overcome this new data and paper problem to draw new information with error corrections and find patterns that allow AI algorithms to help develop new vaccines and drugs (Ahuja2020).

Researchers are developing a new model to promote novel drug development with the help of a drug-specific drug-based training model called the Molecule Transformer-Drug Target Interaction (MT-DTI) to identify commercially available drugs that can work on COVID-19 viral proteins. They concluded that the drug atazanavir, an antiretroviral drug used in the treatment of human immunodeficiency virus (HIV), is an excellent chemical food, indicating a KD resistance of 94.94 nM against SARS-CoV-2 3C-protein protein, followed by remdesivir (113.13 nM), efavirenz (199.17 nM), ritonavir (204.05 nM), and dolutegravir (336.91 nM). Interestingly, lopinavir, ritonavir, and darunavir are all designed to regulate viral proteins. They also suggested that the list of antiviral drugs identified by the MT-DTI model should be taken into account, in developing effective COVID-19 (Beck2020) strategies. A team of researchers from the USA discovered an unknown drug that cured the Ebola virus. The first discovery came into effect in 2014 (Ekins2020), from ML and AI-based pharmacological analysis of a limited number of in vitro-infected Ebola virus carriers.

Studies have proposed amodiaquine and chloroquine used to treat malaria. Furthermore, after uncovering a decade of drug development based on ML and AI technology, a fusion of computational screening method with docking application and machine learning for choosing supplementary medication to investigate on SARS-CoV-2 was proposed (Ekins2020 (1)). A neo-antigen prediction platform that employs state-of-the-art bioinformatics and artificial intelligence (AI) to identify an optimal set of neo-antigens as targets for cancer vaccines or adoptive cell therapies is being used for the development of a SARS-CoV-2 vaccine. ArdImmune has now entered into a research partnership with COVID-19 Vaccine Corporation (CVC Auckland; New Zealand) aimed at developing the SARS-CoV-2 vaccine. Collaborative research enables CVC to benefit from Ardigen vaccine design technology by selecting which viral peaks are most effective in promoting cellular immune response (Hspimedica).

3.3 AI in repurposing of drugs in COVID-19 treatment

AI is implemented in the field design through the generation of the learning-prediction model and performs a quick virtual screening to accurately display the output. With a drug-repositioning strategy, AI can quickly detect drugs that can fight against emerging diseases such as COVID-19. This technology has the potential to improve the drug discovery, planning, treatment, and reported outcomes of the COVID-19 patient, being an evidence-based medical tool (Mohanty2020). In a bid to counter the Coronavirus pandemic that has been rampaging around the world, IIIT Delhi has worked on computational AI model for drug repositioning in the treatment of COVID-19. Some well-known examples of such repositioned drugs are Hydroxychloroquine (HCQ), Dexamethasone, Remdesivir, Avifavir/Favipiravir etc. Lesser-known drugs that are on trial include Ribavirin, Umifenovir, Sofosbuvir and several anti-retroviral (Healthcareradius). The whole explanation of repurposing will be better understood by Figure 1.

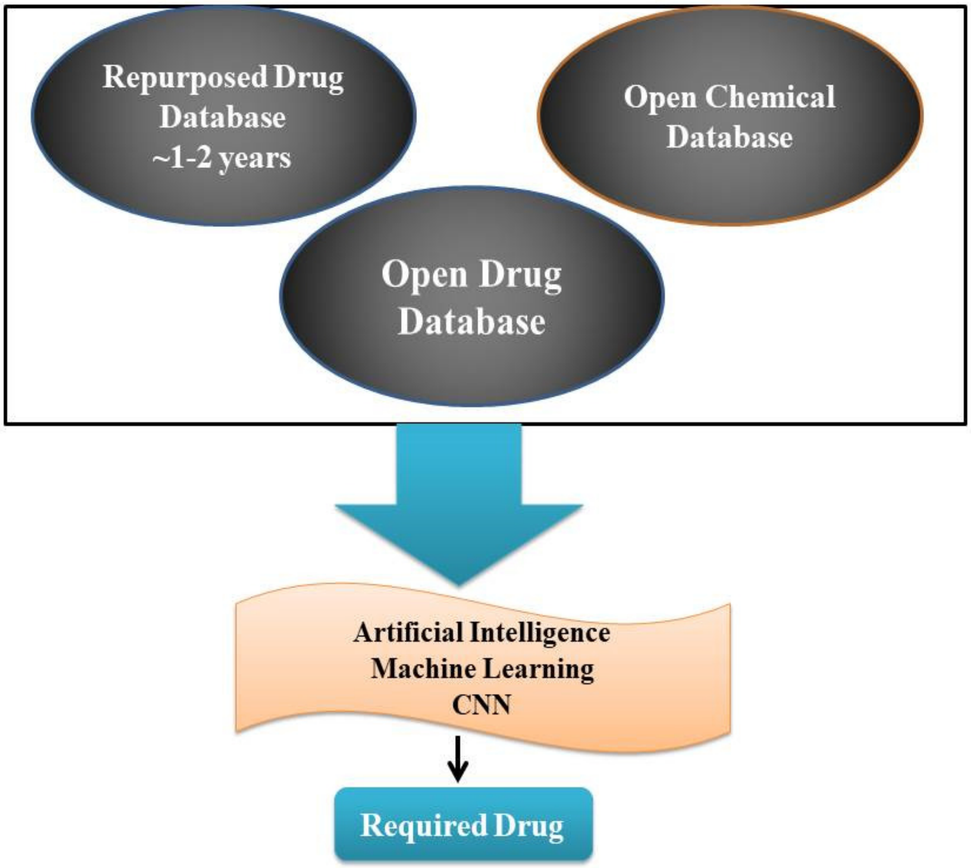

Figure 1. Artificial intelligence (AI) empowered drug repurposing. Abbreviations: Convolutional Neural Networks (CNN).

3.4 AI in COVID-19 detection based on CT scan

Coronavirus disease 2019 (COVID-19) has widely spread all over the world since the beginning of 2020. It is desirable to develop automatic and accurate detection of COVID-19 using chest CT. Researchers designed and evaluated a three-dimensional deep learning model to detect COVID-19 via chest CT scans. On an independent testing data set, they revealed that deep learning model accomplished high sensitivity (90% [95% confidence interval [CI]: 83%, 94%]) and high specificity (96% [95% CI: 93%, 98%]) in the revelation of COVID-19 (Li2020). In another study, scientist used AI algorithms to reconcile chest CT findings with clinical symptoms, exposure history and laboratory testing to rapidly diagnose of COVID-19 positive patients. The AI systems also help to improve the early detection of COVID-19 in patients who have CT scans and associated clinical history available. They did correct identification 17 of 25 (68%) patients who were diagnosed positive for COVID-19 via RT–PCR examination who presented with normal CT scans, although, radiologists allocated all of these patients as COVID-19 negative (Mei2020). In a series of experiments carried out in 3 days on 51 patients, Yicheng Fang et al studied the performance of 2 methods of medical examinations on patients with COVID- 19. Results indicate that sensitivity of chest CT to Covid-19 is higher than the RT-PCR technique (98% for CT versus 71% for PCR). These results support the use of chest CT to examine COVID-19 for patients with clinical and epidemiological characteristics especially when RTPCR results are negative with COVID-19 infective patients (Fang2020).

3.5 The race to find a cure for COVID-19 has begun

Nowadays, AI is being used by many companies to locate and diagnose existing drugs that can be reimbursed for COVID-19 treatment, to aid clinical verification, to filter data, and to scan patient medical records (EMRs). A company like the TCS' Innovation Lab in India, where a team of TCS scientists identified 31 potential cell phones that could block COVID-19 (TCS artificial intelligence cure covid19, 2020) Similarly, a Benevolent AI initiative, which raised $ 292 million to use COVID-19-based AI-based drug discovery, emerged and a drug already approved for the AI-based drug acquisition process COVID-19 as an effective treatment (Potential new treatment for covid-19, 2020) The UK-based company Exscientia has already partnered with Diamond Light Source (a synchrotron national science site) to use its AI drug discovery platform to identify potential comparisons with COVID-19 (AI-technology to screen, 2020). Molecule, First, a start-up European AI-focused development has released its patented editing platform for free access to economic science, in an effort to help researchers quickly and experiment with designated modules in relation to COVID-19. IBM has also used its AI production frameworks in three COVID-19 drug targets and produced 3000 novels potential strikes or molecules (Roy2020). The list of companies using AI-based drug development against COVID-19 has been discussed in Table 2.

Table 2- List of companies applying AI for the development of treatment against COVID-19

Strategy	Name of company	Status
Existing drugs repurposing	**Benevolent AI**	The company has been using AI to repurpose all existing approved drugs against the novel coronavirus. Within a month, they narrowed candidates down to the six most promising molecules with baricitinib, a drug rheumatoid arthritis drug, being most promising for treatment.
	Innoplexus	The Indo-German company began by evaluating the potential of therapies like Hydroxychloroquine and Remdesivir against 2019-nCoV by using data coming from patients. Their AI platform suggested higher efficacy 1. Combination of chloroquine and tocilizumab (a drug for rheumatoid arthritis), 2. Chloroquine and remdesivir and 3. Combination of hydroxychloroquine with clarithromycin (an antibiotic) or plerixa for (antiretroviral).
	Deargen	The Korean company, in collaboration with Dankook University, predicted the activity of available antiviral drugs against the novel coronavirus and the AI platform suggested atazanavir (a drug for HIV treatment) to have high potency.

	Gero	The Singaporean company identified 9 drugs using its AI platform. Among the top molecules predicted to have efficacy against the coronavirus are niclosamide and nitazoxanide, broad spectrum anti-parasitic and anti-viral drugs.
	Cyclica	The Canadian company announced screening of 6700 molecules that are FDA approved or at-least in Phase I human trials on their AI based drug repurposing platform MatchMaker. They have partnered with China's Institute of Materia Medica for in vitro and in vivo assessment.
Designing of new drugs	**In-silico medicine**	The Hong-Kong based company ran operations and published 100 promising small molecules against the 2019-nCoV after a 4-day sprint.
	Exscientia	The UK based company partnered with the Diamond Light Source, UK's synchrotron facility, to screen about 15,000 clinically ready molecules from Scripps Research Institute in California, US.
	Iktos and SRI international	The French AI specialist Iktos plans to design novel molecules and has partnered with US-based SRI Biosciences to utilize their fully automated end-to-end synthetic chemistry system to synthesize and test the molecules.

3.6 AI vs non-AI scenarios

Using data to make better and more automatic predictions is something we already know; what AI offers is a way to manage new levels of scale and data intensity. Various mathematical methods often work within the essentials of built-in or programmed thinking, however AI can work effectively in a wide area where it will help determine whether a molecule fits this system or not. AI can have a powerful impact on the fight against COVID-19 in finding potential treatments and injections. Certainly, yes some time before the explosion of COVID-19, AI was important for its great discovery to contribute to the discovery of the novel compounds (Segler2018). In the wake of the epidemic, many data centres and research labs have already revealed that they are using AI to hunt for therapies that include both vaccines and drugs against COVID-19. Expecting that AI can accelerate the progression of new drugs and the replacement of existing (old) drugs. On the other hand, in the case of a non-AI, we can identify existing drugs that are highly effective through inhibitory coronavirus activities using in-silico or in vitro techniques. According to the conference, the drug acquisition process is very long (usually it can take 9 to 10 years to bring a drug to market), it is complicated and expensive. Therefore, AI can play an important role in speeding up the whole testing process from years to months by testing different scenarios at different parameters at the same time. AI-based drug testing methods may appear to be very useful in understanding an important component of a virus (such as the structure of viral proteins) to determine how active within HIV will play an important role in increasing drug development and injections against COVID-19. In COVID-19, AI has never been proven to have a major impact yet. Its powerful use is restricted due to the simplicity of the available data. To overcome this limitation, careful balances are needed between data privacy and public health, as well as full human interaction (Naude2020, Jain2023).

3.7 Sustainability and increasing level of AI drug discovery strategies

Many important factors are needed to bring an effective public health response to the expulsion of new infections including human exposure and risk, infection, insufficiency time and mortality, causative organism trait, modus genus (Mccall2020). This strategy has worked for SARS and could also help COVID-19 as the information can be used to train and develop an AI application for its dedicated service. AI can achieve cost reduction and increase efficiency; guessing correction and improved service delivery; and quality assurance (Reddy2020, Jain2024). Artificial Intelligence is a new phenomenon that enables machines to take care of matters just as we as human beings do. For decades, computer programs were manually coded to provide specific results from certain entries. Using the AI process, computers can scan complete data to identify important patterns for making useful predictions (How AI can make your marketing more effective, 2020). Under the great potential of AI, there are a variety of reasons associated with proper AI deployments that should also be understood. Every single AI deployment may require a realistic understanding of the future use planned in real situations should be carried out by people who cannot understand data and a related problem to solve it. Most AI-based solutions can be customized to come up with problematic solutions and can be trained in your data while a few niche software's or tools with limited applications can simply be integrated into the organization. AI should be able to configure, select or perform appropriate algorithms and tool computations for specific functionality. Ultimately, these types of AI-based drug discovery are appropriate tackle ongoing operational monitoring through the unit of operational skills, with adequate long-term assistance, control overhaul procedures and model driving controls over time.

4. Conclusion

We believe that AI has an important role in future healthcare offering. As machine learning, it is the primary competence behind the development of precision medicine, widely agreed to advance as essentially necessary in health care. Although early efforts to provide diagnosis and treatment recommendations have proved challenging, we expect from AI to eventually master that domain as well. Given the rapid advancement of AI for the analysis of ideas, it seems that most radiology and pathology images will be scanned at a specific location by machine. AI is not only helpful in the treatment of patients with COVID-19 infection but also in their proper health monitoring. We may encounter many behavioral, medical, occupational, and technological changes through AI in health care. It is important that health care institutions, as well as government and regulatory agencies, establish mechanisms to monitor critical issues that are responsive and establish management mechanisms to reduce adverse effects. This is one of the most powerful and important technologies to affect human societies, so it will require ongoing attention with a policy considered for many years.

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