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RESEARCH ARTICLE

HOW ARTIFICIAL INTELLIGENCE(AI) CAN HELP TACKLE COVID-19 – AN ANALYSIS

Amey Patil¹ and Aakash Patel²

1. Associate Consultant, Bristlecone, Mumbai, India.
2. System Engineer, Infosys, Mysore, India.

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Abstract

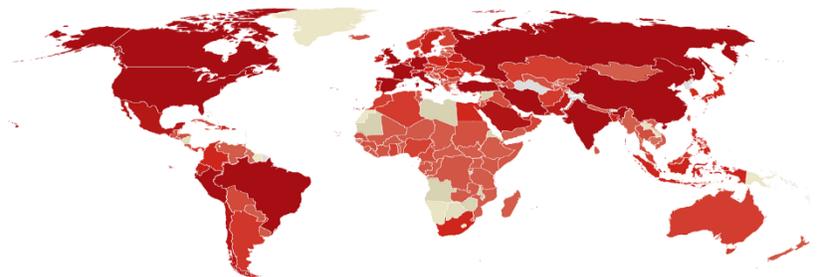
The unanticipated outburst of the Covid-19 since the month of December 2019 has put the world in the face of unforeseeable challenges when it comes to operating industries, whole business ecosystems and minimizing the loss of human life in fighting the battle against this virus. In times like these, where existing and traditional methods of operations cease to function, damage control solutions by using new technologies are being currently tested and implemented to minimize the loss of life and economic complexities. This article discusses various solutions that AI as an upcoming branch of technology can offer in various sectors to curb the spread of virus and reduce the risk of transmission of the Covid-19 virus.

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Introduction:-

The Covid-19 virus first started spreading rapidly in most of the developed and developing countries which have a regular travel frequency to the different countries, originating in China. There has been a total lockdown being exercised in most of the red-zone countries. Most of the affected countries around the globe are tackling the consequences of the global pandemic like a total economic and transportation shutdown which in turn affects major and minor authorities, businesses. To operate and thrive under these circumstances and lawfully abide by the restrictions imposed by the government, businesses and organizations should adapt and improvise their existing methodologies to adopt methods that are more feasible and opportune during these times, Artificial intelligence being one of them. Artificial Intelligence is a technology that has been around since late the 2000s and over the time has been establishing a defined set of applications under its umbrella.

RED COUNTRIES WITH 100 OR MORE CONFIRMED CASES.
BEIGE COUNTRIES WITH FEWER THAN 100.



SOURCE: WHO, CDC, NHC, AND OTHER SOURCES VIA WORLDOMETER

ML and Deep Learning under AI can vastly help ease some of the challenges faced by the government and industries and contribute in even new avenues possible due to the handicap imposed by Covid-19 on functionality.

Literature Review:-

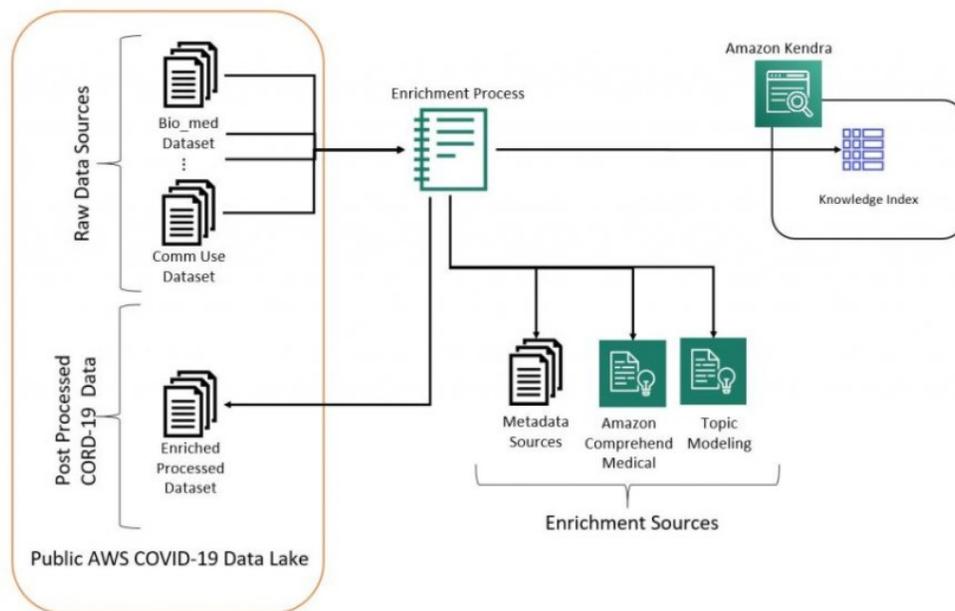
How AI is helping in exploring plausible solutions to the conditions of the patient for their recovery-

Doctors and researchers are overwhelmed by the data obtained from patients suffering from Covid-19 throughout the world. It is difficult to derive legitimate insights from the data and Machine learning can assist with that. In response to this, Amazon Web Services (AWS) has launched a search engine called CORD-19 which helps researchers find accurate results for the conditions they want to look for from research papers and medical articles like “When is the salivary viral load highest for COVID-19?”.

Built on the Allen Institute for AI’s CORD-19 open research dataset of more than 128,000 research papers and other materials, this machine learning solution can extract relevant medical information from unstructured text and delivers robust natural-language query capabilities, helping to accelerate the pace of discovery.

How AI is helping in contact tracing

Along with the AarogyaSetu App which helps in contact tracing, many states like Telangana are integrating AI in their CCTV camera software to recognize mask violators. After identifying it sends a notification to the police headquarters, which in turn sends the update to the patrolling police team. This model is similar to the AI model developed by China for tracking mask violators. Such implementations are done in the cities of Hyderabad, Cyberabad and Rachakonda



CORD-19 Search architecture

AI Robots used in hospitals for healthcare workers and patients.

A range of AI robots have been developed and are being effectively used to assist healthcare workers and patients to reduce the possibility of cross-infection. For example, Chinese firms are using drones and robots to carry out contactless deliveries and spray virus disinfectants in red zone areas to minimize the transmission of corona. Other robots are checking people for fever and other COVID-19 symptoms and dispensing hand sanitizer foam and gel. Robots are also being used to hand out food and medicine to patients and disinfect rooms to minimize contact with human staff and risk transmission. Robot dogs are helping doctors assess patients in hospitals. A company called Boston Dynamics have developed a dog robot called Spot which is used by healthcare workers while dealing with infected patients.



A robot tends to a COVID-19 patient in the intensive care unit of an Italian hospital. (Luca Bruno / Associated Press)

Methods:-

Facilitating earlier diagnosis: -

Diagnosing COVID-19 in sick patients presenting to hospital is currently performed by reverse transcriptase-polymerase chain reaction (RT-PCR) testing of nasopharyngeal and throat swabs. However, initial tests may only be 70% sensitive and turnaround times can be 24 hours or more. ML models combined with virus detection systems using CRISPR (a tool which uses an enzyme to edit genomes by cleaving specific strands of genetic code) can rapidly design SARS-CoV-2 assays which have high sensitivity and speed. AI has also been used to design, within a few weeks, point of care immunoassays for detecting viral antigens within 20 minutes, and prototype testing kits are in development.

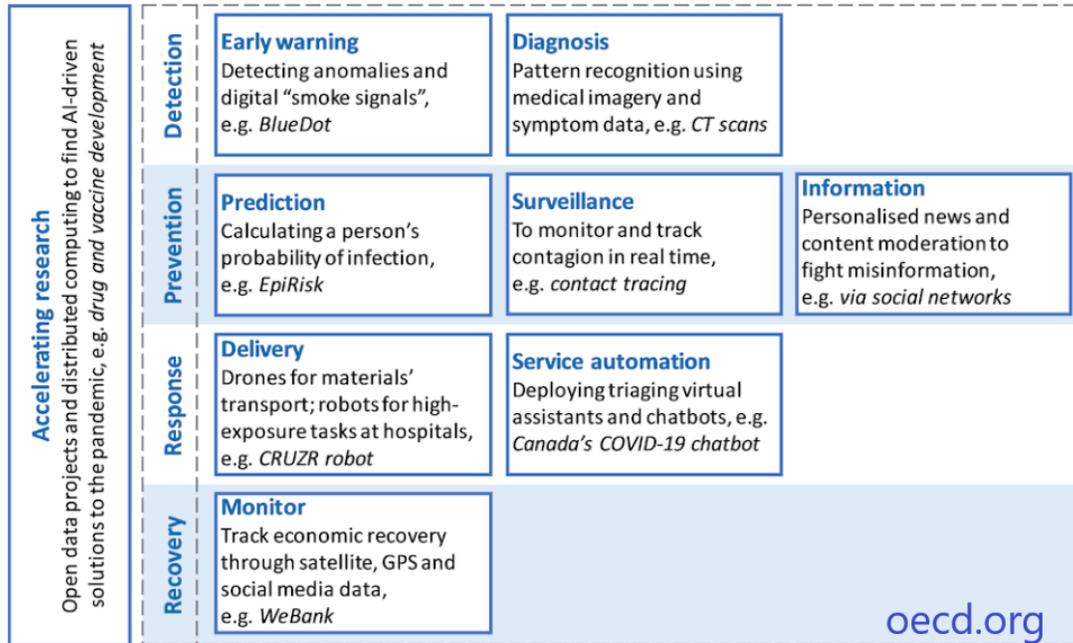
Assisting hospital responses: -

AI mapping tools can track hospital bed capacity and location, number and utilisation of ICU and hospital beds across the US. Another tool tracks numbers of ventilated patients and uses modelling software to predict breaking points for healthcare networks, estimating a shortage of 9,100 ICU beds and 115,000 non-ICU beds for routine care at the peak of the pandemic. At the front line, autonomous AI robots can transport drugs around the hospital and disinfect patients and hospital areas by emitting UV light, reducing interpersonal contact and saving medical and ancillary staff.

Discussion:-

Hence, conferring from the use cases stated and adopted by some parts of the world using AI applications as a probable alternative to carry out tasks with a different approach have yielded better results. These applications can be drafted and segmented as follows for better understanding for industries to derive cogent understanding as per slots of Recovery, Response, Prevention, Detection.

Figure 1. Examples of AI applications at different stages of the COVID-19 crisis



Also, apart from these existing solutions, everyday new and promising solutions are taking shape and are in development which will make a huge difference in tackling Covid-19. Some of the promising solutions are:

COVID 19 and X-rays: -

Across the globe, as Polymerase Chain Reaction (PCR) is expensive and time-consuming, Chest X-rays are now used as a standardized procedure for the diagnosis of COVID-19. However, a simple chest X-ray cannot distinguish the disease and the extent of infection affecting the lungs.

Artificial Intelligence, in collaboration with Chest X-rays, helps in identifying the abnormal findings, thus diagnosing the ground glass opacities in the lungs, which is a classic feature of the COVID-19 disease. Many companies such as Qure.ai, a Mumbai based start-up, and Tata consultancy services have used AI in a chest X-ray for the diagnosis of COVID-19. The AI developed by Qure.ai also helps in identifying the extent of infection affecting the lungs. This is usually valuable for patients who remain in the Intensive Care Unit (ICU).

Food SCM and AI: -

To avoid any disruption to the food supply chain, food processors and governments need to understand the current state of agriculture. Agri-tech start-up Mantle Labs, another AWS customer, is offering its cutting-edge AI-driven crop-monitoring solution to retailers free of charge for a period of three months to provide additional resiliency and certainty to supply chains in the UK. The technology works to assess satellite images of crops to flag potential issues to farmers and retailers early on so they can better manage supply, procurement and inventory planning. The platform deploys custom machine learning models to mix imagery from multiple satellites, enabling a near real-time assessment of agricultural conditions.

Conclusion:-

To conclude the above research, we can say that industries are being open-minded and fearless in adopting feasible solutions to not only survive but thrive during this period using AI tools, be it to aid the infected patients or come up with new ways to operate businesses during this pandemic. For countries, every country should take a different and suitable approach to fight this pandemic as a whole. For example, India will have different challenges to face during the pandemic than USA or Italy. Because these countries have different pain points in their in-built system as an economy which Covid-19 is disrupting. Hence, a detailed study of what suits each best according to the challenges will surely yield positive and productive outcomes which can then be implemented into their respective ecosystem

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