

# **A Novel Computational Model to detect and predict the prognosis and read out diagnosis of any given Pandemic using Convolutional Neural Networks and X-Rays**

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A Pandemic is commonly described as a disease which can rapidly spread across regions - not limited to infecting cities, provinces, countries, and possibly continents. Currently, the world is facing the COVID-19 Pandemic caused by a novel Coronavirus that originated in Wuhan, China. As of April 26th, there have been a total of 2,804,796 confirmed cases and 193,710 deaths [10, WHO]. It is imperative in cases of highly infectious pandemics, that the early detection and prediction of the disease is crucial for public health and safety [1, Lancet] [3, Emerging Infectious Diseases].

Unfortunately, no such early detection warning system is in place for pandemics. Neither is there a fast and affordable way to get lab test results for novel pandemics [4, Nature]. Additionally, the ability to predict the prognosis of pandemics are not in place for target patient use [5, Journal of the Formosan Medical Association] [6, Virology]. I propose a more effective way to detect and predict any pandemic within a population by using a novel computational model that utilizes a convolutional neural network (CNN), which analyzes over one million data sets of x rays and detects the presence of the target pandemic virus and automatically predicts its prognosis just from an x ray of a possible patient.

Attempts have been made previously to detect pandemics using a wide variety of protein and virus classifications [8, Journal of biomedical informatics] [2, BIOT-2009], which are expensive and not readily available for testing in cases of novel pandemics such as COVID-19. Various researchers have also attempted to use computational models to classify the prediction of increase of pandemic cases of an overall population and not the growth of the virus population within a singular patient [7, European journal of epidemiology] [9, Journal of infection and chemotherapy].

I propose a low cost, efficient, and rapid solution for the early detection of pandemics. Using pre-recorded data sets of x ray images of previous patients with similar virus strains to a given pandemic, we can train a convolutional neural network (CNN) to analyze these data sets and have an ability to detect the novel pandemic strains in new patients. This completely removes the need for further R&D expenses in creating point of care diagnostic systems, as all that is required to detect a novel pandemic is just a simple x ray of the patient's lungs. This would allow governments and cities to invest more into hospital equipment and protective gear further strengthening public safety and wellbeing. The system does not stop there. The CNN can be used to also predict the increase or decrease of patient health depending on the number of

viruses being detected by the CNN from just one x ray scan of the patient. This would allow nurses and doctors to use their inventory wisely and save more lives by using resources conservatively.

Creating such technology is surprisingly easy. There are over 1 billion x rays being taken per year [11, Radiation protection dosimetry] and such data sets can be acquired anonymously for training a CNN with detection and predictive capability using TensorFlow and Google Vision APIs. Such technology can be rapidly implemented into the market and dramatically reduce costs for hospitals and cities.

The applications of this solution are limitless. Such CNN can be used for rapid detection of genome classification and be used in gene editing as well as improving current algorithms for better detection and prediction for disease conditions. Combining such technology such as MERN stacks and decentralization can further increase the outreach of the technology to even predict a pandemic before it even happens. Cures can be accelerated with further research and development while the CNN detects and predicts all cases of any given pandemic.

## **Works Cited**

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