Introduction

It is public knowledge that a medical degree is not required to produce artificial intelligence based models that can contribute to healthcare in very important ways, including automated disease diagnosis. Nowadays, computer scientists work in concert with doctors and or medical information/doctor feedback[5], as seen for example in the popular online machine learning/artificial intelligence competition platform, Kaggle, rife with several hundreds of gigabytes of healthcare datasets and freely available albeit powerful "kernels" or artificial intelligence software code. Notably, with dollar values of up to hundreds of thousands of USD, healthcare Kaggle competition winners have been known to be outside of the medical degree world.[6]

Countries with aggressive/thorough testing, seem to face lower mortality rates (eg South Korea, <1% mortality rate[7]) versus countries with terrible/barely existent testing/screening, (eg USA >3.5% mortality rate, close to the global mortality rate of ~3.4%[8]). This paper serves to contribute to extensive testing efforts, to help minimize potentially exponential spread in newly affected regions, and otherwise aid in control even after wide-spread. On March 19, 2020, Epidemiologist Larry Brilliant, (who helped to stop smallpox), says we can beat the novel coronavirus—but first, we need lots more testing.[4]

As such, this paper concerns the application of the Convolutional Artificial Neural Network via machine learning library Tensorflow/Keras, on the task of Covid19 detection.

Design and methods: A convolutional neural network model was trained on a gtx 1060/i7 6700 based computer, on *scarcely available Covid19 Xray ct scan dataset* organized by Jordan[3] *from data gathered from various Covid19 papers*, in combination with *copious amounts of Xray pneumonia data*, based on a Kaggle repository published in 2019 prior to the outbreak of the novel Coronavirus in 2019.[18] This paper is a part of an Xray based/Artificial Intelligence project that began on ***February 9, 2020***, by Jordan Bennett.[1]

Results: Compared to the standard dna/polymerase method proposed by CDC, that achieves ~71% accuracy, (notably atop retesting requirements), the method proposed by this paper achieves ~85%/~70%/~77% on Sensitivity/Specificity/Accuracy.[1]

Conclusion: Models like the artificial intelligence covid19 detection model included in this paper[1], are reasonably usable by both medical and non-medical staff. One particular use-only model released by China, reports a sensitivity of 97%+.[2]

A quick look of the Smart Covid19 Detector in action: bit.ly/343Cp8f

Why automated diagnosis is reasonably needed

The nCov 2019 (Coronavirus Strain 2019/2020) is spreading rapidly, with a mortality rate between 2% and 4%.[11]

By comparison, the common flu with a far lower mortality rate of .1%, kills 291,000 to 646,000 per year.[10]

Things get worse; nCov spreads at ~triple the transmission rate of the common flu.

- Common flu RO = 1.28 (Estimated transmission rate)[12]
- nCov RO = 2.5 to 3.8 (Estimated transmission rate)[13]
- Recent nCov 2019/Covid19 incubation period is estimated at 24 days.

Current diagnosis methods may miss the presence of the virus due to faulty dna based comparison methods, where multiple negative test results may occur before positive results are gained. In addition, more doctors (or rather more automated diagnosis methods) can improve identification rates of the virus.

This ai driven method will reasonably help to stop the exponential growth[14] of the nCov strain.

The viability of (lung) Xray-Scan based diagnosis

On February 19, 2020, scientists revealed a ~98% accuracy in human/radiology based CT Scan image based diagnostics, compared to the popular Dna polymerase chain reaction method by CDC: "In a series of 51 patients with chest CT and RT-PCR assay performed within 3 days, the sensitivity of CT for COVID-19 infection was ~98% compared to RT-PCR sensitivity of ~71% (p<.001)."[9]

Xray Test Result Time versus Dna Method (Comparison)

- Molecular and Serology Tests: Up to 2 days before testing is verified.[16]
- Xray Image Scan + Artificial Intelligence Diagnosis[1]: ~5 minutes (for scan[17]) + A few milliseconds for Ai diagnosis[1]= ~6 minutes total time for diagnosis result including possible image processing.

Software architecture rationale

1. Covid-19/Coronavirus2019/nCov share many similarities with pneumonia. In fact, the time course evolution of a specific strain of covid-19 pneumonia is studied.[19]
2. There are already existent pneumonia deep learning platforms, including kaggle contents rife with deep learning kernels/solutions, pertaining to pneumonia detection.[20]
3. A pretrained neural network is chosen from kaggle[18], pertaining to (2). Pretrained model usage is a way to avoid training on the 2 gigabytes of pneumonia/non-pneumonia training set[20], mentioned in the “design and methods” section of the introduction.

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