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Intelligent Diagnosis System of COVID-19 (SDI-COVID) from X-Ray/Tomography Images Angola Cables and Movement Respira Brasil

Abstract

Due to the Pandemic that the world is facing, many methods are being developed to mitigate the effect of the disease globally. Nowadays, the world is developing solutions in different areas such as Engineering, Medicine, Biology and so forth, with the help of an heterogenous group of specialists. Angola Cables, with the goal of helping the prevention and the detection of the disease, joined the Respira Brasil's Movement (In English: Breath Brazil Movement) in order to collaboratively build an Intelligent Agent capable of detecting in a person the existence of COVID-19 from a X-Ray or Computer Tomography (CT) image. Such initiative helps to accelerate the detection of the Virus (less than 15 minutes to get the results), mitigate the lack of testing in areas where there is no PCR testing materials, including rural areas, and to make it easy and cheap the testing process.

Comprehending and controlling the COVID-19 pandemic, requires the massification of tests. Testing is the greatest tools to slow and reduce the dissemination and the impact of the virus.

Identifying contaminated individuals guides to a medical treatment and to allocate medical resources and workers more efficiently. It allows the confinement of the infected and the tracing and quarantine of their contacts.

Angola Cables and Movement Respira Brasil

Because of the lack of radiologists in comparison with the high number of Thorax Radiography made and available for analysis, a Detective Model with support of Artificial Intelligence must be developed to help Radiologists and other specialists in decision making. In this case, an automatic system of COVID-19 Detection which is reliable, available and with a stable performance must be used to help the diagnostic process. Many recent studies, suggests that the precision of a specialist diagnose can be augmented when a system that uses Artificial intelligence as a base with sensibility greater than 80% is used as an assistant in the decision making.

Methodology

A huge number of X-Ray are generated in various hospitals. The quantity of samples of COVID-19 patients is not high but it is an acceptable number to train an Artificial Intelligence model that is capable to classify **COVID-19 Positive** or **COVID-19 Negative**. The proposed methodology is to create a database with X-Ray/CT Samples. The cluster of images will be hosted in the Angola Cables datacenters and then, different Artificial Intelligence algorithms will be developed. These algorithms will be using this database to learn and distinguish whether an X-Ray/Tomography image is or is not a COVID-19 Positive.

The biggest goal is that this Classifier Agent needs to be available online and that it can be accessed by any specialist in the world to facilitate the decision making process in COVID-19 situations. The big difference from this Convolutional Neural Network with the existing ones is that it will be trained with X-Ray from patients from Brazil, Angola and the rest of the world. Other existing models were not trained with this type of data.

In the diagram below, we have a practical representation of how the system is designed to work.
The Movement Respira Brasil and Angola Cables' Data Science team joined effort to build and train the Intelligent Agent.

Link of Respira Brasil movement : https://movimentorespirabrasil.com.br/

In addition to the SDI-COVID, Angola Cables is also contributing in the Combat COVID-19 Africa digital platform (https://www.combatcovid-19.africa/).
Combat COVID-19 Africa is a collaborative platform that will be launched on May 25th, and it aims to connect African digital volunteers helping combat the spread of COVID-19. The platform offers digital volunteers' free access to cloud computing resources to help them build and scale their solutions. By doing this, the platform hopes to enable collaborations amongst all Africans working to stop the spread of COVID-19.
The platform connects software developers, data scientists, network engineers, governments, non-profit organizations, private sector and health professionals. Combat COVID-19 Africa is a Pan-African platform that will give Africans an opportunity to work together to solve the continents toughest issues when fighting COVID-19.