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COVID ML: A Novel Artificial Intelligence Based App for Efficient Diagnosis of COVID-19 and other Lung Related Illnesses using Chest X-Rays

Vibha Addala
vibha.addala13@k12.leanderisd.org
Vandegrift High School

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Abstract

According to the World Health Organization (WHO) over 5.5 million people across the world have died due to SARS-CoV-2. Efficiently and accurately diagnosing people with COVID-19 is essential to help slow down the spread of the virus. Although swab tests do exist, they are not easily accessible in underdeveloped areas, whereas Chest X-Ray scanning has been available before the pandemic. In developing countries such as India, Chest X-Rays cost only about $3.62 hence are cost friendly. However, there is a lack of radiologists to analyze and diagnose illnesses from Chest X-Rays. Artificial Intelligence was used because it can accurately diagnose patients by learning from examples of previous patient data. Specifically in this project, Transfer Learning and Convolutional Neural Networks (CNN) were used since this project involved analyzing a limited amount of image data. After three fine-tuned CNN architectures were built, the VGG-16 fine-tuned architecture received the highest testing accuracy and hence was embedded into an app built in android studio using Java. After being tested with 100 images, the app's accuracy in detecting if someone had COVID-19, a Viral Illness, a Bacterial Illness, or None was 100%, 92%, 96%, and 100% respectively. This project was presented to doctors across the world as well as to research professors at Portland State University, Oregon Health and Science University, UT Austin, and UPenn for insights on improvements that can be made. All necessary improvements will be made to COVID ML so this app can be implemented in real life.