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AI-driven web application for detecting COVID-19 from CT-SCAN or X-Ray images

Summary :

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, is a global crisis that has affected individuals worldwide since its outbreak in Wuhan, China, in December 2019. This pandemic has posed significant challenges, causing numerous difficulties and thousands of fatalities. One of the main obstacles is the inability of both developed and developing nations to test all suspected COVID-19 cases due to overpopulation, limited testing facilities, and a shortage of medical professionals.

The focus of this work is to propose a technological solution for detecting COVID-19 symptoms in infected patients. The objective is to utilize machine learning and image processing techniques to analyze X-ray and CT scan images of patient's lungs and compare them with data from healthy lungs. By doing so, the system aims to detect and identify the stage or condition of an infected patient, providing a more efficient approach to diagnose COVID-19.

Technologies and Methods:

In order to identify COVID-19 from X-ray and Ct scan images, a deep neural network is required, specifically a convolutional neural network (CNN) model known as Xception. This model has been trained on a large dataset of X-ray and CT scan images to accurately classify COVID-19 from normal scans. With its ability to learn from large amounts of data and automatically extract relevant features, the Xception model holds great potential for medical imaging and disease detection. The dataset utilized in the study, sourced from Kaggle, comprises multiple sub-datasets containing two classes, COVID-19 and Normal.

I also used Flask and Python to connect the machine learning model to the website. For the front-end design, I incorporated HTML, CSS, JavaScript, Bootstrap, and jQuery to create an engaging user interface. To store the patient information, I utilized MongoDB, a non-relational database. During the development process, I also utilized Unified Modeling Language (UML) to describe, visualize, project and document the object-oriented system. Additionally, I worked with Google Colab to test and fine-tune the model's performance.

Result :

On the test set, the proposed network achieved an accuracy of 98% for separating the COVID-19 from the Healthy group. The results of this proposed network demonstrate the effectiveness of the Xception model with architecture optimization by GA because it finds the best architecture for this study.

Conclusion :

My project involved developing a web Application with a deep neural network model for detecting COVID-19 from chest X-ray and CT scan images. The proposed network demonstrated high accuracy rates in detecting COVID-19 cases, which can be beneficial for radiologists who need to make rapid and accurate diagnoses. By utilizing this web Application , radiologists can save time and effort that would be required to manually examine each image, and instead rely on the model's automated detection capabilities. The development of this Web Application has the potential to revolutionize the way that radiologists diagnose COVID-19 cases and can help in the fight against the ongoing pandemic.