Detecting Covid-19 with ECG Images and Deep Learning

COVAX

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01. PROBLEM DEFINITION

Currently, most detection of Covid-19 is based on X-Ray for chest and Neural Network Algorithms. This will be the one of the first studies that will explore the possibility of using deep convolutional neural network (CNN) and Efficient-Net models to detect COVID-19 and other cardiac abnormality detection from electrocardiogram (ECG) trace images. The approach of deep learning on ECG trace images has been explored with promising results. And with this it will be easy to take an image from your phone and see if you have Covid-19 or not and can be used by doctors also for rapid results.

02. OBJECTIVES

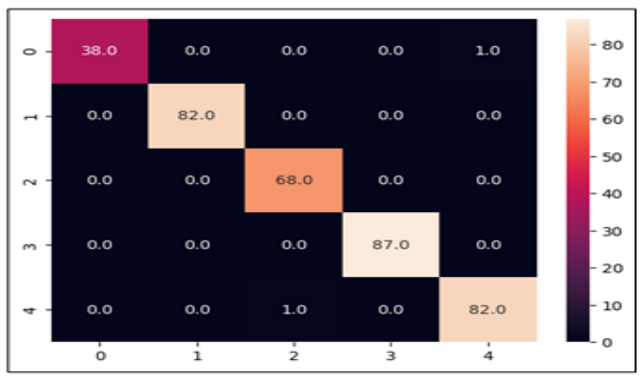
We are approaching the problem by applying machine and deep learning methods (shallow learning and CNN models), In medical image analysis, there is no large dataset available due to privacy issues to train the deep learning models. Therefore, the researchers use other techniques to get rid of this problem like data augmentation to increase the number of images, we seek to provide application that can help in faster computer-aided diagnosis of COVID-19 and other cardiac abnormalities from ECG images using Machine learning and deep learning techniques

03. METHODOLOGY

The methodology consists of five main phases:

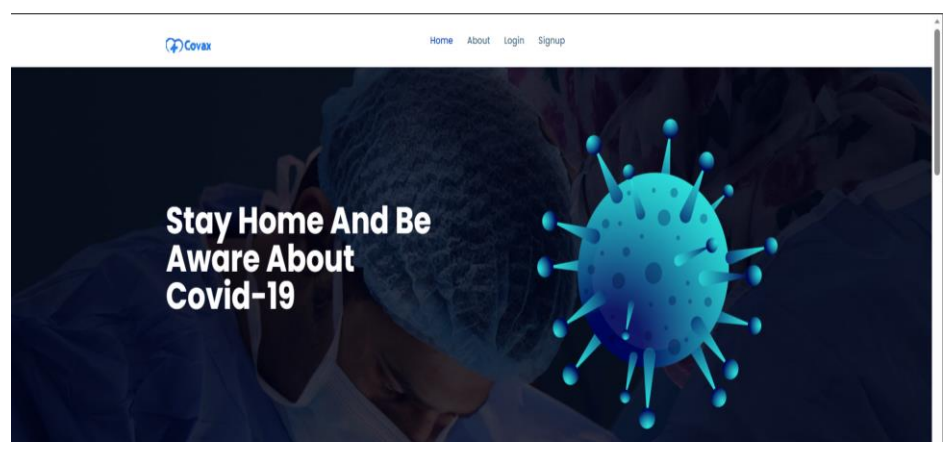
- data collection, filtering the ECG paper reports, augmenting the ECG reports, extracting most discernment features, and classifying the ECG reports.
- In preprocessing we used the Histogram of Oriented Gradients (HOG) is a popular pre-processing technique to extract and quantify the gradient orientation information from an image also we use other preprocessing Techniques like Image Conversion, Cell Formation, Block Normalization and HOG Feature Vector.
- For the data we are Appling Data Preprocessing, Classifier Initialization, Testing and Performance Evaluation.

EfficientNetB3 confusion matrix.



04. DELIVERABLES

We are providing a website and mobile application that offers a quick and reliable services for researchers and doctors, also some statistics and reports related to the detection of the patient that can help doctor to diagnosis the patients.



05. Methods

Hardware tools:

This Project does not need any specific hardware except one's personal computer or smart phone.

software tools:

1-Machine and deep learning algorithms and Classification techniques like shallow learning and CNN models.

2- Project's web application:
For the front-end methodologies we are using Bootstrap framework, HTML, CSS, and JavaScript.
For back-end development we are using Flask Framework (Based on Python).

3- Project's mobile application:
We are using Flutter which is a free and open-source UI framework for creating native mobile applications, Dart and SQL.

06. Recommendation

1. Allow user to use the camera of his phone to take a picture and upload it to the application.
2. By allowing our patient uploading and saving their images as a data in our application therefore, we will have a big data and we can use a new model to get a 100% accuracy.
3. We can also add a new feature like suggest the nearest doctor or Hospital that can help our patients.