Atrial Features-based Classification of COVID and Normal ECG Using Extra Trees Model

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Background: The coronavirus disease 2019 has induced significant cardiovascular complications besides respiratory anomalies. Recent studies have suggested a probable correlation between covid and atrial fibrillation, the most prevalent arrhythmia in clinical settings.

Aim: This study aims to identify the changes in COVID and normal Electrocardiogram (ECG) images using supervised machine learning algorithms to predict the risk of developing atrial arrhythmias during and post coronavirus infection.

Method: Twelve-lead ECG images of 108 COVID patients and 52 normal individuals were taken from the online database: ECG Images dataset of Cardiac and COVID-19 patients. As P wave is a significant indicator of atrial activity, clinical ECG features such as P-wave amplitude (µV), P-wave dispersion (ms), PR segment (ms), P-wave area (µV ms), and the ratio of P-wave area and duration (µV) were measured and given as input to 10 machine learning models. EP Calipers software was used to measure these attributes and 75% of the dataset was used for training whereas 25% was used as the test set.

Results: The Extra trees (ET) model exhibited accuracy, precision, recall, and F1 score of 90%, 88.8%, 82.5%, and 83.9% respectively. The computational time for the ET model is 0.45s. P-wave area was ranked highest whereas the PR segment attained minimum rank according to the ET classifier.

Conclusion: The Extra trees model being computationally faster, outperformed the remaining nine models in categorizing COVID and non-COVID ECG images using P wave indices and amplitude. Follow-up post covid is essential to prevent future possibilities of developing arrhythmias.

Electrocardiogram image of covid negative individual depicting the P wave indices.