allied academies

Joint event on

10th WORLD HEART CONGRESS

&

6th International Congress on

CARDIOLOGY AND CARDIAC SURGERY

December 02-03, Dubai, UAE

Kayapanda Mandana

Fortis Hospitals, India

Artificial intelligence and machine learning technology for early non-invasive detection of Coronary Artery Disease

Coronary Artery Disease (CAD) is a leading cause of death globally. The proven Gold standard to diagnose CAD is an invasive procedure, leading to Coronary Angiography. However, all physiological manifestations of CAD either appear late in the Time- Curve or are non-specific surrogate markers.

Affordable non-invasive solutions for health monitoring have become an important area of research. With the advent of Artificial Intelligence (AI), there has been newer multi-modal non-invasive sensing and analysis. We started with Fuzzy expert system approach for CAD screening using clinical parameters. Following this we screened CAD patients and recorded their Phonocardiogram (PCG) signals along with simultaneously recording of Photoplethysmogram (PCG). Important information regarding heart sounds generated by early CAD is typically confined within 150 Hz. Following this we proposed a new multi-channel PCG -based system to classify CAD affected individuals and normal individuals. We simultaneously acquired PCG signals produced by weak CAD murmurs from four different auscultation sites. The two-class classification is done in a machine learning framework by employing an artificial neural network (ANN) classifier.

A Multi-modal approach for Early Non-invasive detection of CAD is being proposed here using various Machine learning techniques tested in a tertiary care Hospital, wherein patients with various degree of CAD and age matched normal individuals were studied.

In first stage, a hierarchical rule-engine identifies the high cardiac risk population using patient demography and Medical history, who are then further analysed in second stage using numeric features from Various Cardiovascular Signals. These numeric features were simultaneously extracted from the CAD predicted subjects from Single lead ECG, PCG and PPG.

Results in these 160 subjects (CAD 80 and Normal 80), show that the proposed approach achieves sensitivity=0.96 and Specificity=0.91 in classifying CAD patients on an in-house hospital dataset, recorded using commercially available sensors.

Performance of the existing CAD classifiers, available in literature is often compromised due to inconsistent manifestation of discriminating patterns in a single cardiovascular signal. Our study shows that the performance can be significantly improved if multiple CAD markers are effectively combined using Domain knowledge.

Biography

Kayapanda Mandana is at present Director of Cardiac Surgery at Fortis Hospitals in Kolkata, India. He has been a Consultant Cardiac Surgeon for over 30 years and has keen interest in Cardiovascular research, especially Coronary Artery Disease. He had his formal Cardiac surgery training at Mahe University, Manipal, in south India and then went on to work at University Hospital of Wales, in Cardiff, UK. At present he has been a Research Advisor for TCS (Tata consultancy services), in Eastern India and Advisor /Principal Investigator in the Department of Electronics and Electrical Engineering, Indian Institute of Technology, Kharagpur, India. He has over 25 international published articles on this subject. (CAD, Early detection). He has been a member of various societies (STS in UK, IACTS in India and FETCS: Fellow- European Board of cardio thoracic surgeons).

e: kmmandana@gmail.com

Notes: