

3rd International Conference on EHEALTH NETWORKING, APPLICATION AND SERVICES

March 14-15 2024 | Webinar

Revolutionizing heart failure event prediction: A cutting-edge machine learning framework using mHealth

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Acute Decompensated Heart Failure (ADHF) is the most prevalent cause of acute respiratory distress worldwide, accounting for the majority of new cases and associated fatalities according to global statistics, making it a serious public health issue at present. Timely diagnosis plays a pivotal role in improving prognosis and survival rates, underscoring the urgency for early detection. Advances in the use of Artificial Intelligence (AI) to analyze echocardiography and cardiac MRI data have been substantial in recent years, shedding light on the symptoms of potential hazards and the likelihood of future cardiovascular problems. We provide a prediction model in this research that is specifically designed to predict outcomes in outpatients with heart failure. Employing ten classification models such as Decision tree classifier, Adaptive boosting classifier, Random forest classifier, Gaussian process classifier, Gradient boosting classifier, k-nearest neighbors classifier, Extra tree classifier, Gaussian Naive Bayes classifier, Multi-layer perceptron, and Support vector machine, we assess the prognosis of patients based on a diverse set of features. Notably, the order of feature importance is determined through recursive feature elimination, revealing key predictors such as gender, diabetes mellitus, systolic blood pressure, sodium levels, and heart rate. The effectiveness of our machine learning algorithm is rigorously evaluated across various metrics, including precision, recall, and F1 scores. Furthermore, a web application utilizing the Python Flask web development framework was developed by integrating the proposed model.

Biography

Keerthiveena Balraj earned her Ph.D. degree from Anna University, in 2021 and has 7+ years of research experience in the field of medical image analysis. Presently, she is a postdoctoral researcher and coordinator of the data analytics division at the Centre of Excellence in Biopharmaceutical Technology, Indian Institute of Technology Delhi. She manages research and development efforts in mHealth for heart failure, pancreatic cancer, Glycan analysis, brain tumour identification, and video-based cardiac function monitoring. Her research interest includes medical image analysis, optimization techniques, and machine learning.