International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 03 | Mar 2021 www.irjet.net p-ISSN: 2395-0072

# DETECTION OF HEART DISEASES USING DATA MINING TECHNIQUES

**S. Aparna, S. Keerthana, D. Beula Hepziba**

[1,2,3] *B.E, Computer Science Engineering, Francis Xavier Engineering College, Vannarpet, Tirunelveli, Tamil Nadu 627003*

---

**Abstract:** Cardiovascular diseases are the most common cause of death worldwide over the last few decades in the developed as well as underdeveloped and developing countries. Early detection of cardiac diseases and continuous supervision of clinicians can reduce the mortality rate. However, accurate detection of heart diseases in all cases and consultation of a patient for 24 hours by a doctor is not available since it requires more sapience, time and expertise. In this study, a tentative design of a machine learning based heart disease prediction system had been proposed to detect impending heart disease using Machine learning techniques. For the accurate detection of the heart disease, an efficient machine learning technique should be used which had been derived from a distinctive analysis among several machine learning algorithms. Machine Learning is used across many spheres around the world. The healthcare industry is no exception. Machine Learning can play an essential role in predicting presence/absence of Locomotors disorders, Heart diseases and more. Such information, if predicted well in advance, can provide important insights to doctors who can then adapt their diagnosis and treatment per patient basis. And in addition we also predicting the diabetes diseases the machine learning. Algorithms like Random Forest, Support Vector Machine, Naïve Bayes and etc., are used to build a machine learning model. Here discusses and compares the various data analytics techniques available for the heart diseases prediction. However, the selection of the appropriate algorithm from the pool of available algorithms imposes challenge to the researchers with respect to the chosen heart diseases. The accuracy of training model should be higher and error rate should be minimum.

**Keywords:**

Heart disease detect, Machine learning, Support vector machine.

**Scope:**

The goal of this study is to develop a reliable multi-channel MCG based IHD early detection and localization system. The database came from a retrospective study of cardiovascular disease including multiple hospitals in China. Coronary angiography was applied to IHD group as the gold standard, and the detailed medical records, including the degree and location of stenosis, were well documented. The feature design integrated MCG features from time domain, frequency domain and information theory.

**Introduction:**

The expanding rate of cardiovascular ailment, the expansion in geriatric populaces and the interest for autonomous living are driving the development of remote observing gadget markets. Heart disease is the most common cause of death in huge number around worldwide over the last few decades in the developed as well as underdeveloped and developing countries. Early prediction of heart diseases with diabetes of continuous supervision of clinicians can reduce the mortality rate. Heart disease describes a range of conditions that affect your heart. Diseases under the heart disease umbrella include diabetes, blood vessel diseases, such as coronary artery disease; heart rhythm problems (arrhythmias) and heart defects you're born with (congenital heart defects), among others.

The term heart disease& is often used interchangeably with the term cardiovascular disease. Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina) or stroke. Other heart conditions, such as those that affect your heart muscle, valves or rhythm, also are considered forms of heart disease. Over time, high blood glucose from diabetes can damage your blood vessels and the nerves that control your heart and blood vessels. The longer you have diabetes, the higher the chances that you will develop heart disease. ... In adults with diabetes, the most common causes of death are heart disease and stroke.

However, accurate detection of heart diseases in all cases and consultation of a patient for 24 hours by a doctor is not available since it requires more patience, time and expertise. In this study, a tentative design of a heart disease prediction system had been proposed to detect impending heart disease and diabetes using Machine learning techniques. For the accurate detection of the heart disease, an efficient machine learning technique should be used which had been derived from a distinctive analysis

among several machine learning algorithms. Diagnosis of heart is done by prediction of it.

There are numerous orders calculations, however why we are proposed arbitrary backwoods here means, Random woodland calculation can utilize both for characterization and the relapse sort of issues. At the point when contrast with other grouping and relapse calculation arbitrary woods gives more precision in light of the fact that there are enormous of choice trees happens in irregular woodland that is why it gives higher exactness results more when contrast with other order and relapse calculations. Thusly, Early acknowledgment of heart disease will bolster the patient and people to envision heart disease and to give indications of progress treatment for heart disease and diabetes, with the objective that passing pace of heart disease can be consistently reduces.

**Existing System:**

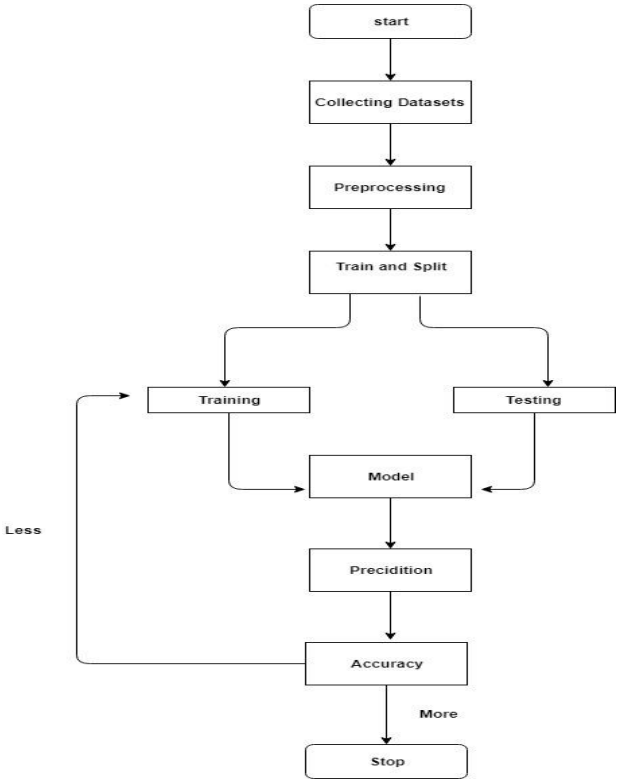
Portable devices for the home monitoring of cardiac health are expected to witness substantial growth in coming years. The increasing incidence of cardiovascular disease, the increase in geriatric populations and the demand for independent living are driving the growth of remote monitoring device markets. Electrocardiography (ECG) is still the most widely used diagnostics tool in hospitals and at home. The measurement equipment for ECG, however, is not readily available for most patients, so they must acquire it and learn how to use it. An alternative rhythm management method, mechano cardiograph (MCG), is based on measuring the mechanical motion induced by the heart .Clustering-Based Detection: Unsupervised k-means clustering was used as a second beat detection method. First, all local maxima and minima are computed from the pre-processed signal. Second, the amplitudes of consecutive maxima and minima are considered to be features for the k-means clustering process. The algorithm's ability to estimate heart rate was evaluated. First, an additional refinement step was carried out since each false peak significantly changes the estimated heart rate.

**Disadvantage**:

- Uses single trained model
- Only able to run in python platform.
- Less accuracy with machine learning model.

**Proposed System:**

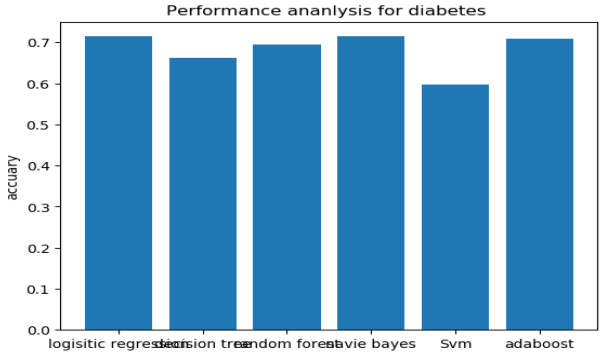
In this study, a sensor modality and algorithm fusion of automatic and stand-alone (ECG-independent) heart beat detection is considered for enhanced heart beat detection. The investigation was carried out with healthy patients and those with heart disease.



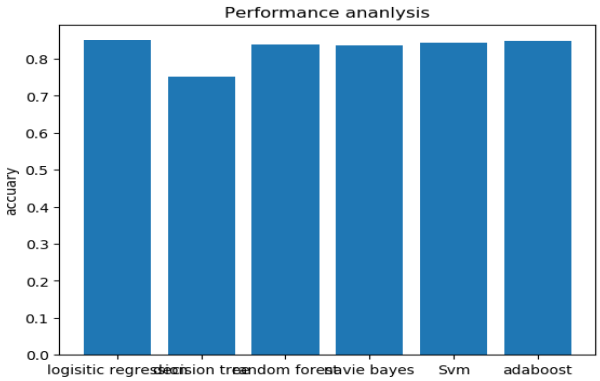

The algorithm selects the best signal, removes the motion artefacts, detects the beats based on the signal envelope and morphological characteristics, and finally merges the detected beat locations using both accelerometer and gyroscope signals. For these reasons, beat-to-beat detection from mechanical motion signals with accurate timing and amplitude information is still one of the main challenges in the analysis of these signals.

**Algorithm analysis:**

For diabetes:



For heart diseases:




**Conclusion:**

The early prognosis of cardiovascular diseases can aid in making decisions on lifestyle changes in high-risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. This project resolved the feature successfully and predicts the heart disease, with accuracy. The model used was Logistic Regression. Further for its enhancement, we can train on models and predict the types of cardiovascular diseases providing recommendations to the users, and also use more enhanced models.

**Reference:**

[1] P. A. Heidenreich, J. G. Trogdon, O. A. Khavjou, J. Butler, K. Dracup, M. D. Ezekowitz, E. A. Finkelstein, Y. Hong, S. C. Johnston, A. Khera, et al., "Forecasting the future of cardiovascular disease in the united states: a policy statement from the american heart association," Circulation, vol. 123, no. 8, pp. 933–944, 2011.

[2] S. S. Yadav and S. M. Jadhav, "Machine learning algorithms for disease prediction using iot environment," International Journal of Engineering and Advanced Technology, vol. 8, no. 6, pp. 4303–4307., 2019.

[3] S. Ghwanmeh, A. Mohammad, and A. Al-Ibrahim, "Innovative artificial neural networks-based decision support system for heart diseases diagnosis," Journal of Intelligent Learning Systems and Applications, vol. 5, no. 3, p. 176, 2013.

[4] J. Nahar, T. Imam, K. S. Tickle, and Y.-P. P. Chen, "Computational intelligence for heart disease diagnosis: A medical knowledge driven approach," Expert Systems with Applications, vol. 40, no. 1, pp. 96– 104, 2013.

[5] R. Detrano, A. Janosi, W. Steinbrunn, M. Pfisterer, J.-J. Schmid, S. Sandhu, K. H. Guppy, S. Lee, and V. Froelicher, "International application of a new probability algorithm for the diagnosis of coronary artery disease," The American journal of cardiology, vol. 64, no. 5, pp. 304–310, 1989.

[6] N. Cheung, Machine learning techniques for medical analysis. School of Information Technology and Electrical Engineering. PhD thesis, B. Sc. Thesis, University of Queenland, 2001.

[7] S. Palaniappan and R. Awang, "Web-based heart disease decision support system using data mining classification modeling techniques.," in iiWAS, pp. 157–167, 2007.

[8] I. S. F. Dessai, "Intelligent heart disease prediction system using probabilistic neural network," International Journal on Advanced Computer Theory and Engineering (IJACTE), vol. 2, no. 3, pp. 2319–2526, 2013.

[9] F. Moreno-Seco, L. Mico´, and J. Oncina, "A modification of the laesa algorithm for approximated k-nn classification," Pattern Recognition Letters, vol. 24, no. 1-3, pp. 47–53, 2003. Proceedings of the Second International Conference on Innovative Mechanisms for Industry Applications (ICIMIA 2020) IEEE Xplore Part Number: CFP20K58-ART; ISBN: 978-1-7281-4167-1 978-1-7281-4167-1/20/$31.00 ©2020 IEEE 171 Authorized licensed use limited to: University of Wollongong. Downloaded on May 30,2020 at 04:22:20 UTC from IEEE Xplore. Restrictions apply.

[10] E. Alpaydin, "Voting over multiple condensed nearest neighbors," in Lazy learning, pp. 115–132, Springer, 1997.

[11] J. Chen, Y. Xing, G. Xi, J. Chen, J. Yi, D. Zhao, and J. Wang, "A comparison of four data mining models: Bayes, neural network, svm and decision trees in identifying syndromes in coronary heart disease," in International Symposium on Neural Networks, pp. 1274–1279, Springer, 2007.

[12] R. Das, I. Turkoglu, and A. Sengur, "Effective diagnosis of heart disease through neural networks ensembles," Expert systems with applications, vol. 36, no. 4, pp. 7675–7680, 2009.

[13] S. S. Yadav and S. M. Jadhav, "Deep convolutional neural network based medical image classification for disease diagnosis," Journal of Big Data, vol. 6, no. 1, p. 113, 2019.

[14] M. Fathurachman, U. Kalsum, N. Safitri, and C. P. Utomo, "Heart disease diagnosis using extreme learning based neural networks," in 2014 International Conference of Advanced Informatics: Concept, Theory and Application (ICAICTA), pp. 23–27, IEEE, 2014.

[15] D. Khanna, R. Sahu, V. Baths, and B. Deshpande, "Comparative study of classification techniques (svm, logistic regression and neural networks) to predict the prevalence of heart disease," International Journal of Machine Learning and Computing, vol. 5, no. 5, p. 414, 2015.

[16] K. Polat, S. S¸ahan, and S. Gu¨nes¸, "Automatic detection of heart disease using an artificial immune recognition system (airs) with fuzzy resource allocation mechanism and k-nn (nearest neighbour) based weighting preprocessing," Expert Systems with Applications, vol. 32, no. 2, pp. 625– 631, 2007.

[17] V. Krishnaiah, G. Narsimha, and N. S. Chandra, "Heart disease prediction system using data mining technique by fuzzy k-nn approach," in Emerging ICT for Bridging the FutureProceedings of the 49th Annual Convention of the Computer Society of India (CSI) Volume 1, pp. 371– 384, Springer, 2015.