

Chapter 2

A Review on IoT–Driven Technologies for Heart Disease Diagnosis and Prediction

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ABSTRACT

People around the world are at risk from chronic diseases like cancer, heart disease, and diabetes. When it comes to sudden cardiac arrest, many people have recently become increasingly concerned. The main cause of death in the world is heart disease. Because it needs both experience and advanced knowledge, predicting heart disease is a difficult assignment. Sensor values are being collected for heart disease detection and prediction using internet of things (IoT), which has recently been implemented in healthcare systems. In order to achieve a continuous remote cardiac monitoring system, IoT and wireless technology have advanced significantly over the past several years. The use of various sensors, such as electrocardiograms (ECGs), thermometers, and blood pressure monitors to collect important body signals and diagnose illnesses has resulted in the creation of a wireless body area network. The diagnosis of cardiac disease findings is low in accuracy. The goal is to highlight IoT-driven technologies that have been used in the literature for diagnosing and forecasting heart disease.

INTRODUCTION

Humans have become accustomed to the Internet of Things (IoT), which is employed in a wide range of industries, including education, finance, and social networking. New technologies are being adopted by the healthcare business in order to provide smarter and better healthcare facilities (Y. E. Gelogo et al., 2015). Remote and real-time patient monitoring is now possible thanks to the Internet of Things (IoT). This enables doctors to monitor patients' health in real-time and provides them with the information

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they need to provide appropriate treatment or advice. In order to save lives and promote a healthy way of life for the general population, early detection of heart disease is critical given the enormous number of people who suffer from it. The ability to follow a patient's health status on a regular basis has improved dramatically because of the development of various IoT capabilities and instruments (H. Mora et al., 2017). Patients are also able to communicate with their doctor more readily, resulting in a higher level of satisfaction and a reduced hospital stay and healthcare costs. Utilizing IoT in healthcare is primarily focused on creating a completely automated environment for patient monitoring and real-time care. Portable ECG systems that can be used by patients at home to measure their ECG profiles and diagnose their illness in real-time are becoming increasingly popular. As a result, a thorough examination of currently available technologies for monitoring heart-related disorders is conducted in this work. The raw data has been analyzed and found to include a lot of noise and irrelevant information. Inaccurate and irrelevant facts are not useful in determining the cause of the problem. The classification accuracy, sensitivity, and precision are reduced as a result of the high level of noise and volatility in data. A unique pre-processing method is utilized in this research to remove noise and unrelated data from ECG signals.

The correlation approach is used to identify the most important qualities in order to increase data efficiency. ECG waveforms are used to classify ECG signals using machine learning algorithms such as KNN, naive Bayes, and Decision Tree. Using the classifier with the best performance metrics can help diagnose ECG waveform fluctuation and identify abnormalities and diseases. The rest of the paper follows this pattern. Heart disease and IoT are discussed in Section 2, while Section 3 focuses on related research. Surveyed Techniques are explained in Section 4. The conclusion is presented in section 5.

BACKGROUND

A person's quality of life is severely affected if they have cardiac difficulties. The broad deployment of cutting-edge technology can enhance healthcare systems. The invention of a smart wearable IoT health monitoring device is revolutionizing our lives (ITU-T, 2012). Medical services have made great development in recent years. Technology advancements will allow for a larger choice of services to be provided to patients. As a result of this progress, the quality of life of a substantial segment of the people will increase. Wearable IoT devices allow patients to monitor and regulate their health parameters more effectively. Patients may be alerted about their status at any moment, which is a benefit of these gadgets. To save a patient's life or treat a patient's condition in an emergency, medical professionals can utilize this information. One of the most promising uses of new technology is in the field of connected health. Connected healthcare systems and smart embedded IoT devices may help both businesses and individuals. As a result of this research, it is hoped that linked health systems may be developed that can better inform patients on the state of their health and offer them early medical warnings. It is the goal of the Internet of Things (IoT) to link anything and everyone, everywhere, at any time, via any method, network, or service (O. Vermesan and P. Friess, 2013; R. Clarke, 2013). This objective necessitates further work in a variety of areas, including communication and software. Many research and development organizations are involved in the process. In other terms, the Internet of Everything (IoE) is a network of computers and gadgets of all shapes and sizes that communicate and share information in networks of connections, as defined by Cisco (D. Evans, n.d.).

Cisco predicts that by 2020, there will be 50 billion Internet-connected gadgets. As a metaphor, the Internet of Things (IoT) is a web of webs. There is a separate IEEE standard being created for the IoT's

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