Chapter 18
Optimized Generalised Metric Learning Model for Iterative, Efficient, Accurate, and Improved Coronary Heart Diseases

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ABSTRACT

Artificial intelligence (AI) is bringing about a revolution in the healthcare sector thanks to the growing availability of both structured and unstructured data, as well as the rapid advancement of analytical methodologies. Medical diagnosis models are essential to saving human lives; thus, we must be confident enough to treat a patient as advised by a black-box model. Concerns regarding the lack of openness and understandability, as well as potential bias in the model's predictions, are developing as AI's significance in healthcare increases. The use of neural networks as a classification method has become increasingly significant. The benefits of neural networks make it possible to classify given data effectively. This study uses an optimized generalized metric learning neural network model approach to examine a dataset on heart disorders. In the context of cardiac disease, the authors first conducted the correlation and interdependence of several medical aspects. A goal is to identify the most pertinent characteristics (an ideal reduced feature subset) for detecting heart disease.

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INTRODUCTION

Millions of people throughout the world suffer from the deadly medical illness known as coronary heart disease (CHD). As a primary cause of death and disability, it is essential for effective treatment and management of the condition to make an early and precise diagnosis (Jeba et al., 2023). Machine learning, a branch of artificial intelligence, has shown great promise in accurately diagnosing and predicting CHD. A rising number of people are now interested in creating machine learning models that are accurate, efficient in processing massive volumes of data, and improve continuously over time (Kanyimama, 2023). This has led to the development of various approaches, including Optimised Generalised Metric Learning (OGML), which aims to learn a distance metric that is optimized for a particular task (Kaushikkumar, 2023). This project aims to develop an Iterative, Efficient, Accurate, and Improved (IEAI) machine learning model using an OGML approach. The IEAI model will be designed to accurately predict the presence of CHD, be efficient in processing large amounts of data, and continually improve its accuracy over time (Lodha et al., 2023). The creation of a reliable and precise CHD diagnosis technique has the potential to greatly enhance medical results and save lives (Murugavel & Hernandez, 2023). The results of this investigation may aid in the early diagnosis and efficient treatment of CHD, allowing medical personnel to offer patients prompt and effective care (Ogunmola et al., 2021).

Innovative healthcare solutions are now possible thanks to Technology's recent rapid advancements, particularly in the fields of machine learning and the Internet of Things (IoT) (Parate et al., 2023). The prospect of utilizing these technologies to create intelligent systems for the early detection, diagnosis, and individualized management of CHD has been investigated by researchers and practitioners (Saxena & Chaudhary, 2023). The combination of smart devices, data analytics, and cloud/fog computing platforms has been the focus of several studies looking into the applications of machine learning and IoT in healthcare. With the help of these investigations, a comprehensive and connected healthcare ecosystem will be developed that will allow for accurate risk assessment, real-time monitoring, and prompt intervention for CHD patients (Latha et al., 2022). The Internet of Things (IoT) has emerged as a potential paradigm, allowing the linking of numerous wearables, sensors, and medical equipment to continuously collect physiological data. Electrocardiograms (ECG), heart rate, blood pressure, physical activity, and sleep patterns are just a few of the many types of data that these devices can gather (Patel & Bhanushali, 2023). The analysis of this data using machine learning algorithms can then yield insightful conclusions and reveal trends that point to CHD. The need for better diagnostic techniques is highlighted by the fact that coronary heart disease continues to be a leading cause of mortality and disability worldwide (Sajini et al., 2023). A subfield of artificial intelligence called machine learning has shown promise in precisely detecting and predicting CHD (Rajasekaran et al., 2023). The need for accurate and effective CHD diagnosis models has been addressed using a variety of strategies, including Optimised Generalised Metric Learning (OGML). This study's goal is to create an IEAI machine learning model using OGML that would produce precise CHD predictions, process sizable amounts of data quickly, and continuously improve accuracy (Rajasekaran et al., 2023).

The purpose is to develop a trustworthy and accurate CHD diagnosis method, improving medical results and maybe saving lives (Sohlot et al., 2023). The study seeks to promote CHD early diagnosis and treatment by leveraging machine learning and OGML breakthroughs. Medical practitioners will gain from the proposed IEAI paradigm since it will make patient treatment quick and effective (Regin et al., 2023). The IEAI machine learning model's technique and application are presented in this publication (Rajest et al., 2023a). The model's iterative structure enables continual improvement through the