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Research Article

Forecasting the Applied Deep Learning Tools in Enhancing Food Quality for Heart Related Diseases Effectively: A Study Using Structural Equation Model Analysis

Sunil L. Bangare,[1] **Deepali Virmani**,[2] **Girija Rani Karetla**,[3] **Pankaj Chaudhary**,[4] **Harveen Kaur**,[5] **Syed Nisar Hussain Bukhari**,[6] **and Shahajan Miah**[7]

[1]*Department of Information Technology, Sinhgad Academy of Engineering, Savitribai Phule Pune University, Pune, India*
[2]*Vivekananda Institute of Professional Studies-Technical Campus, School of Engineering & Technology, New Delhi, India*
[3]*School of Computers Data and Mathematical Sciences, Western Sydney University, Sydney, Australia*
[4]*GRD Institute of Management & Technology, Dehradun, India*
[5]*Chitkara University Institute of Engineering and Technology, Chitkara University, Punjab, India*
[6]*National Institute of Electronics and Information Technology (NIELIT), MeitY, Government of India, Srinagar, J&K, India*
[7]*Department of EEE, Bangladesh University of Business and Technology (BUBT), Dhaka, Bangladesh*

Correspondence should be addressed to Shahajan Miah; miahbubt@bubt.edu.bd

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The term heart-related disease is stated as the range of condition that impacts an individual heart negatively. In the current scenario, cardiovascular diseases are causing more deaths when compared with other ailments, it has been estimated that there are nearly 18 million deaths annually as per the recent report released by World Health Organization (WHO). It has been stated that unhealthy habits and other related aspects adopted by individuals are considered as the primary reasons for an increase in the risk of heart diseases. High cholesterol, eating more junk foods, hypertension, etc., created the issue related to heart diseases. Hence, addressing food quality and suggesting better eating habits enable individuals to enhance their living and support better health. The application of new technologies like machine learning, deep learning, and other models support doctors, nurses, and radiologists to predict heart disease effectively. Studies have stated that the various models are used mainly for the classification and forecasting of the diagnosis of heart-related diseases. The researchers have identified that critical algorithms like CART support the predictability of the disease by 93.3% whereas the conventional models possess vert less specificity. Furthermore, deep neural networks can be applied for analyzing and detecting heart failures effectively and supporting medical practitioners in making better and more critical clinical decisions making. The researchers focus on using a descriptive research study for performing the study; moreover, the researcher collates the data using the questionnaire method, which enables sourcing the critical information from the medical practitioners and supports in making critical data analysis effectively. The researchers also use secondary data modes for sourcing the information related to past studies on the related topic. The researchers use the frequency analysis, correlation analysis, and structural equation model analysis for performing the study, and the results are stated in detail in the respective sections.

1. Introduction

One of the critical parts of the human body is the heart as it is responsible for pumping blood to each part of the body, any issue in the heart will impact different organs and it might quit working, which may lead to the demise of the individual. Heart disease is considered a critical fatal disease and is the major reason for many fatalities in the world. Based on the report released by WHO, it has been noted that heart disease accounts for nearly 17.5 million deaths per year across the globe and

accounts for nearly 31% of world fatalities. The report also mentioned that lifestyle changes, increased eating of junk foods, hypertension, obesity, high cholesterol, and other aspects are major causes of increased heart diseases among individuals [1].

The emergence of artificial intelligence has paved the way in the medical industry to offer better analysis and early detection of diseases, this enables doctors and others to provide better treatment to patients and enable in enhancing their life expectancy. The food quality and consumption of appropriate food enable individuals in enhancing their health and well-being, most cardio diseases occur due to poor eating habits. Food enables enhancing the health and well-being of individuals, the researchers have been contemplating using different tools and technologies which will enable addressing the eating habits of individuals to combat heart disease and reduce the death related to heart diseases and this has always been the focal point for many years. Moreover, heart diseases possess the nature of critical detection, early treatment, and better recovery. Hence, early detection is the key to providing novel treatment methods and helping patients to come out of the deadly disease. Modern health care centers are now focusing on recording the patent-related information in a confidential manner and hence can enable the use of this information for better treatment. The hospital collects and saves critical data like blood sugar levels, pressure, cholesterol recordings, heart rate, type of chest pain, and other critical information [2]. Previously, the manual and conventional mode of analysis of computing and analysing the data was time-consuming and therefore create more disadvantages for individuals.

Artificial intelligence tools like the deep learning method support analysing and predicting to solve issues, these models enable in collection and analysis of large data information of medical information so as to measure whether the patient possesses disease and create better accurate forecasting of the results in an effective manner. Major deep learning models like neural network technology support vector machines and K-nearest models are used in order to analyse the data effectively and support in forecasting the trend so that better treatment methods can be applied to enhance the individual's life.

The usage of deep learning methods shown in Figure 1 supports reducing the computation time and enables normalising the data for better accuracy. Many researchers have noted that the usage of deep learning models supports greatly in analysing the data very effectively and the dataset can be increased through the usage of deep learning models these aspects can be effectively analysed [4]. Deep learning tools like multilayer neural networks enable performing the classification of data sets in heart-related diseases with more accuracy when compared with the traditional models. The application of different dimensionality supports the implementation of the unsupervised network that supports classifying cardiac issues. The models like fast independent component analysis enable applying different components with more accuracy.

1.1. Model. Artificial intelligence technology is one of the most widely used technologies today; especially in health care, food and beverages, this technology has many uses.

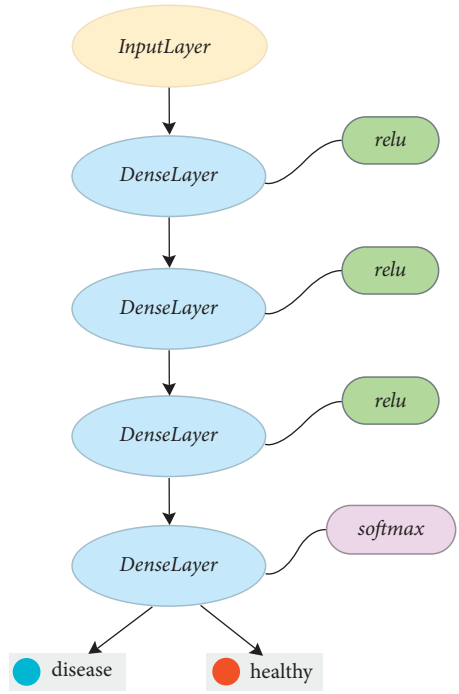

Figure 1: deep learning model [3].

Analysis and forecasting, food quality analysis, materials, food classification, and hypothetical testing are some of the benefits of artificial intelligence technology. ML is widely used to diagnose diseases because technology can detect a patient's medical history when predicting an appropriate treatment plan. The food industry strives to keep companies afloat and food security low due to targeted negotiations. Automation is the best way to solve these problems in the food industry. According to a study by Wahl and colleagues, artificial intelligence programs are effective and efficient when used in appropriate situations. Artificial intelligence technology is important in the health and nutrition sectors because, in addition to analysing how the disease progresses and treatment options, these technologies are important in determining the overall cost of treatment. Thus, artificial intelligence increases the quality of service (SQ) increase in health facilities. Artificial intelligence is more than that. Helps the world solve problems, transform the food industry automatically and change food quality. The company has the ability to monitor and monitor quality conditions for improved crop production, plant health, irrigation, and climate management through digital technology and improved food quality. In-depth learning is a fast-growing field in the information that promises success in cardiovascular medicine. The use of DL for large-scale data analysis can not only identify hidden information in complex and diverse databases, but also close the gap between pathogenic diseases, genotypes, and phenotypes to facilitate individualized treatment. However, for the cardiovascular revolution, DL will need to address the need to improve the capture, interpretation, and durability of large amounts of recorded data and to develop common methods of validation and fry assessment. In-depth learning is one of the most exciting

new developments in heart disease, with enhanced and effective monitoring capabilities.

The study is mainly focused on analysing the role of deep learning models in forecasting heart-related diseases, the major factors chosen for the study are: better accuracy, forecasting the disease using effective analysis, and enhanced feature selection method for greater estimation.

The next section discusses some literature surveys, followed by the methodology involved. Then the limitations of the work are described and then a discussion on the results is done. Finally, the conclusions have been made.

2. Review of Literature

Previous studies are mainly based on a data set with 13 properties. Classification is common in all studies to forecast in an effective manner towards the heart disease and also support addressing the needs of individuals in an efficient manner. The results obtained were as accurate as the random forest with an accuracy of 89.2%. Furthermore, there is a greater accuracy of using another model. RNA with an accuracy of 92.7%, 89%, 89.7%, and 88% SVM accuracy. GA *þ* NN creates a hybrid model with 94.2% accuracy. The PCA models reached more than 90% of accuracy as a regression coefficient. Here, the dimension reduction technique supports creating a better focus on critical components like choosing the critical aspects, supporting in validating the overall performance and using different aspects to compute the selected attributes [5].

Apply well processed and use the data in a large state the better efficiency of the mode, the usage of normal data set usually contains some irrational values whose properties are not compatible with the set. These abnormal values are called extreme values. The heart disease database is analysed and the quadratic amplitude (IQR) method is used to detect and eliminate extremes. It should be noted that natural markers in healthy individuals are generally in a similar range, and abnormalities in some biological markers may indicate disease [6]. The goal of the usage of normalisation support in enhancing the network that is trained and supports standardising the information that offers and supports greater results [7].

It has been regarded that food habits are one of the critical factors for prolonged heart disease and therefore it should be considered for enhancing the health and wellbeing, furthermore, the researchers suggested that reducing high cholesterol foods will support in enhancing the life span and assist the individual to come out of heart disease in an effective manner [8]. Also, researchers mentioned the proper diet can help in coming out of the ailments in an effective manner [9].

The advent of artificial intelligence has opened the way for more accurate evaluation and diagnosis in medicine, allowing doctors and others to better treat patients and prolong their lives. Proper nutrition and consumption of healthy foods allow people to increase their health and wellbeing, many heart diseases are caused by poor nutrition. By providing food for human health and wellbeing, researchers have come up with the idea of using various devices and technologies that reduce human consumption to combat heart disease and save heart disease. It has been a constant concern for many years. Also, important symptoms of heart disease, early treatment, and better recovery. Therefore, early diagnosis is the best way to prescribe new treatments and help patients avoid dangerous diseases. Today's hospitals now see patent information in an anonymous registry and can therefore use this information for better treatment. Hospitals collect and store important information such as blood sugar levels, blood pressure, cholesterol records, heart rate, type of chest pain, and other important information.

Artificial intelligence technology has many benefits in various areas of health care such as screening, productivity increase, productivity services, health monitoring, and so on. Accordingly, the production of the food and beverage industry, storage, distribution, security, and strict control. Many experts say that artificial intelligence technology is the future of the healthcare industry and the food industry as it is used to improve the overall SQ of hospitals, but the automation of the food industry will help increase costs and productivity and reduce losses.

2.1. Methods. The authors focus on analysing the role of deep learning models in identifying heart-related diseases, hence this study uses descriptive research design as it supports the researchers to comprehend the subject area effectively. Furthermore, the researchers use the quantitative approach in performing the study, hence, using both primary and secondary data sources. The questionnaire is being framed and circulated to the sample population who are mainly medical practitioners, radiologists, and others who use the reports in estimating the heart disease of individuals. The 5-point Likert scale is used in order to understand the opinion of the sample population in relation to using deep learning tools towards estimating heart disease. Moreover, secondary data sources are also used for understanding the previous studies conducted in a similar area [10]. Online libraries like EBSCO, Google Scholar, SAGE publications, and others are used for collating the previous studies. Moreover, the researchers apply AMOS statistical package in order to perform structural equation model analysis and estimate the nature of relationships between the variables [11].

2.1.1. Hypothesis

Ho: There are no differences between the deep learning-based accuracy and estimation of heart diseases through better food sustainability among patients.

Ho: There are no differences between the deep learning-based forecasting methods and estimation of heart diseases among patients through proper eating habits.

Ho: There are no differences between the deep learning-based feature selection through food-related aspects and estimation of heart diseases among patients.

2.1.2. Analysis. The next part of the section provides a detailed understanding of the data using statistical tools.

2.2. Descriptive Analysis. From Tables 1 and 2, it is analysed that 47.8% have mentioned that they strongly agree that the usage of deep learning methods enables in enhancing data standardisation of the medical records, this enables in easier analysis and perform various estimation so as to detect the heart disease effectively, also 26.9% of the respondents have agreed. Nearly 12.6% of the respondents are neutral and the remaining are disagreeing with the statement. This is shown graphically in Figure 2.

The next step is to analyse the role of deep learning methods in rendering better medical support for the practitioners to make better decisions.

The analysis in Table 3 shows that 28% strongly agree that the implementation of deep learning methods supports providing augmented medical support to the patients and can effectively detect heart diseases in advance, also 42.3% have agreed, and only 12.1% are neutral to the statement. This is shown in Figure 3.

2.3. Correlation Analysis. The second step of the analysis is to estimate the nature of the relationship among the critical factors. The researchers have chosen: Better Accuracy; Forecasting Methods; Feature Selection, and Forecasting of Heart Disease as the key attributes.

Table 4 reveals a detailed understanding of the association among the variables using the coefficient of correlation, based on the table, it is identified that the dependent variables possess a high positive correlation towards deep learning-based estimation of heart diseases, It is further mentioned that the highest correlation lies between forecasting methods and heart disease with the value of +0.869, followed by forecasting methods and heart disease at +0.864, also the third-factor feature selection possess correlation of +0.828 towards estimating the heart diseases using deep learning methods.

2.4. Structural Equation Model Analysis. The SEM analysis supports the researcher in understanding the association among the variables, the path diagram intends to state the linear relationships of the intended attributes considered for the study, it is one of the users which supports the researchers to estimate, assess and present the model in an effective and intuitive method. The path diagram in Figure 4 provides a better graphical representation of the data and summarise the association in a visual format.

Table 5 shows that the p coefficients. of all the variables are less than 0.05, hence the alternate hypothesis is considered. Furthermore, the major coefficient like the goodness of fit (GFI) is 0.808, relative fit index (RFI) is 0.874, comparative fit index (CFI) is 0.925 and PCFI is 0.622 showing that the model is considered as the best fit.

The novelty of the paper is that the advent of artificial intelligence has paved the way for improved treatment and diagnosis, allowing doctors and others to improve patient care and prolong life. Eating a healthy and healthy diet enhances people's health and wellbeing, as many heart diseases are caused by poor nutrition. To improve human health and fitness, researchers have developed various devices and techniques that reduce food intake to fight heart disease and save heart disease. This has been a constant concern for many years. With major symptoms of a heart attack, early treatment is best to recover. Therefore, early diagnosis is the key to providing new treatments and helping patients avoid dangerous diseases. Hospitals today can access accurate information in an anonymous registry and therefore can use that information for better treatment. Hospitals collect and store important data such as blood sugar levels, blood pressure, cholesterol records, heart rate, type of chest pain, and other important information.

Artificial intelligence has many benefits in various areas of health care such as screening, productivity growth, productive services, health monitoring, and others. Food, beverages, manufacturing, warehouse, distribution, security, and the important regulatory industry are important. Many experts believe that artificial intelligence technology is the future of the health and food industry, as it has been used to improve the entire hospital and hospital environment, but automation of the food industry will help increase costs and save and reduce productivity losses.

2.5. Limitation. The main limitations of the study are the paper is more focused on understanding the application of deep learning tools in enhancing food quality for heart-related diseases effectively. The researchers have focused on using primary data analysis in performing the study, hence, the information may be biased. Also, the researchers have collected data from only 182 respondents.

Table 1: descriptive statistics.

Descriptive	Enhanced data standardisation	Medical support
Mean	4.03	3.74
Std. deviation	1.203	1.173
Skewness	−1.201	−0.898
Std. error of skewness	0.18	0.18
Kurtosis	0.514	−0.038
Std. error of kurtosis	0.358	0.358
Minimum	1	1
Maximum	5	5

Table 2: enhanced data standardisation.

Enhanced data standardisation	Frequency	Percent
Strongly disagree	12	6.6
Disagree	11	6
Neutral	23	12.6
Agree	49	26.9
Strongly agree	87	47.8
Total	182	100

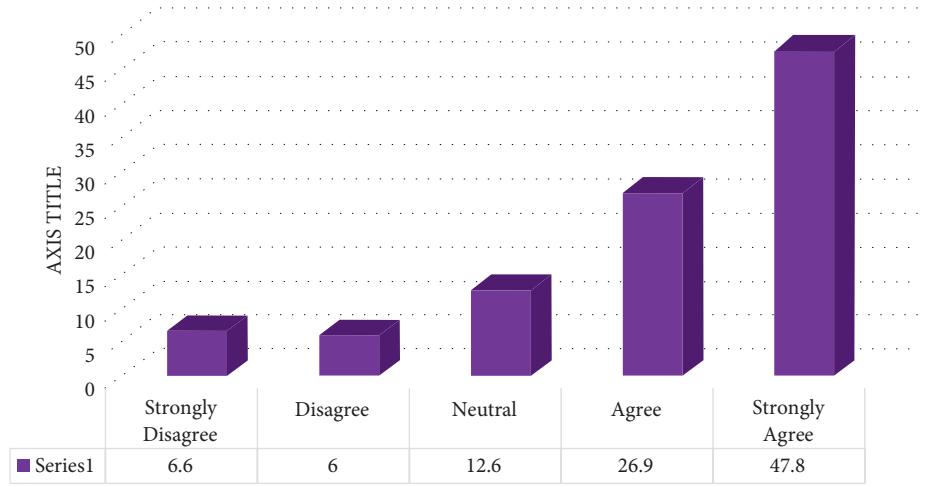

Figure 2: enhanced data standardisation.

Table 3: medical support.

Medical support	Frequency	Percent
Strongly disagree	12	6.6
Disagree	20	11
Neutral	22	12.1
Agree	77	42.3
Strongly agree	51	28
Total	182	100

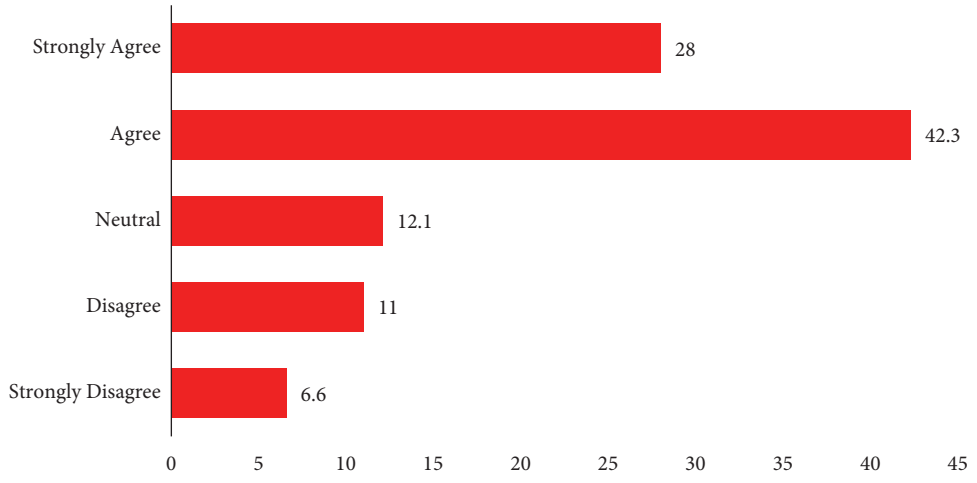

Figure 3: medical support.

Table 4: coefficient of correlation analysis.

Coefficients	Better accuracy	Forecasting methods	Feature selection	Heart disease
Better accuracy	1	0.888	0.812	0.864
Forecasting methods	0.888	1	0.863	0.869
Feature selection	0.812	0.863	1	0.828
Heart disease	0.864	0.869	0.828	1

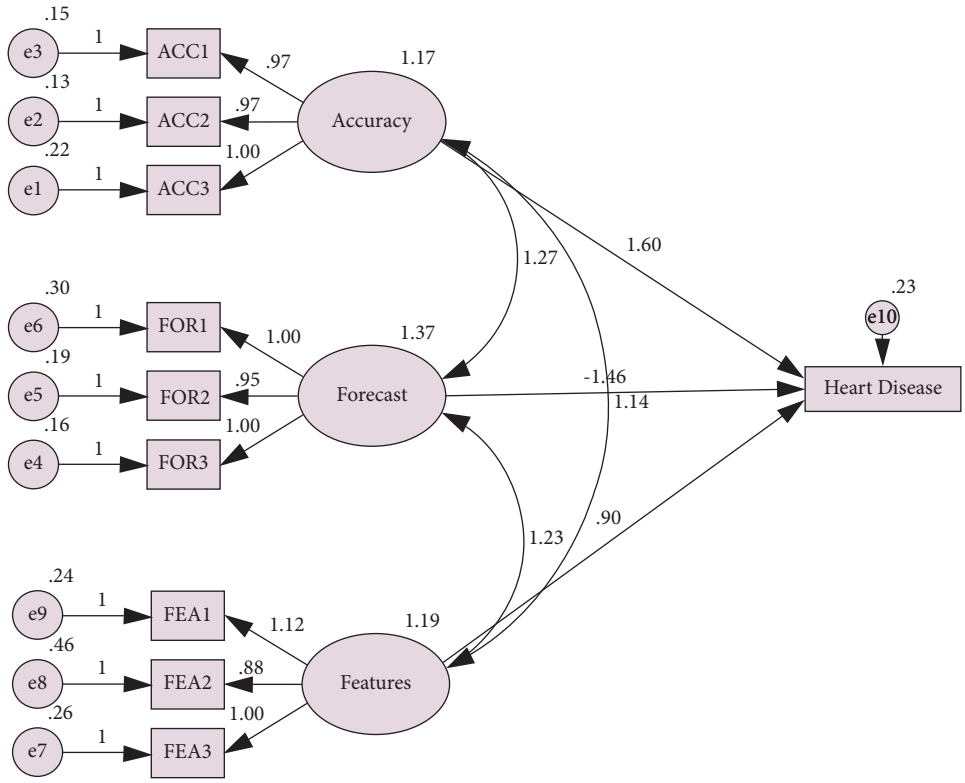

Figure 4: path diagram.

Table 5: p coefficients of all variables.

Dependent variable	Independent variable	Estimates	Std. err.	P coefficients
Heart disease	Accuracy	1.604	64.41	0.01
Heart disease	Forecasting	1.459	58.74	0.00
Heart disease	Feature selection	0.901	0.84	0.02
Model fit	GFI	RFI	CFI	PCFI
Default	0.808	0.874	0.925	0.622

3. Discussion

The term heart disease refers to a number of conditions that adversely affect an individual's heart. According to a recent report from the World Health Organization (WHO), the current scenario is that cardiovascular disease causes more deaths than other diseases, with an estimated 18 million deaths each year [12]. Unhealthy habits and other related aspects adopted by individuals have been pointed out as the main causes of increased risk of heart disease. Hypercholesterolemia, fast food, high blood pressure, etc., caused the heart disease problem. By using new technologies such as machine learning, deep learning and other models, doctors, nurses, and radiologists will effectively predict heart disease. Studies have shown that different models are mainly used to classify and predict the diagnosis of heart disease. The researchers found that critical algorithms such as CART support the predictability of the disease by 93.3%, while traditional models have lower specificity. Deep neural networks can also be used to effectively analyse and detect heart failure, helping physicians make better, more critical clinical decisions [13]. The emergence of artificial intelligence has paved the way for the medical industry to better analyse and detect diseases in the past, enabling physicians and others to provide better care for patients and improve their life expectancy. Leading models for deep learning such as support vector machine's neural network technology, and K-closest models are used for efficient data analysis and trend prediction so that better processing methods can be used to improve the individual's life.

3.1. Individual Selection. This involves converting raw data into features that reduce the length of the data but still represent relevant health or psychological question and may explain the risk of overdose [14, 15]. The input data was digital over the ECG voltage series but Figure 2(b) use features such as QRS length and internal errors. Since DL has significant advantages in simulating complex circuits, it is also possible to avoid data processing under difficult conditions with work [16, 17]. The general purpose DL can be

simplified so that the algorithm can automatically execute the task selection for the user, rather than requiring the user to perform the tasks himself.

3.2. Predicting Missing Data. Like statistical methods, the DL method can be very sensitive to data loss. How the registration will be done is still being considered [18, 19]. Decisions can be made about how to respond to missing data based on the presence or absence of certain factors related to the required results or observations [20-22]. Relevant data is "overlooked" and can be "ignored" unnecessarily. Identifying this type of missing data is important before analysing the data 28. There are several evaluation methods. One way to record systematic inactivity is to use such tags. For example, because people who are too weak (such as an increase in serum creatinine) to avoid a CT scan (CT) are more likely to suffer than a CT scan of the heart, they are more likely to be graded, as "very sick."

4. Conclusion

The researchers believed that different tools and techniques were used to reduce heart-related deaths, and this has always been the focus for several years. In addition, the nature of heart disease is critical recognition, prompt treatment, and better recovery. Therefore, early detection is crucial to provide new treatments and help patients recover from a terminal illnesses. Modern healthcare centers are now focusing on capturing patent information confidentially so that they can afford to use that information for better treatment. The hospital collects and records critical data such as blood sugar, blood pressure, cholesterol, heart rate, type of chest pain, and other important information. Previously, the manual and traditional way of calculating and analysing data was time-consuming and therefore caused more inconvenience to individuals. Using in-depth learning methods reduces computation time and normalises data for greater accuracy. Many researchers have noticed that the use of in-depth learning models greatly facilitates highly efficient data analysis, the dataset can be expanded and the use of in-depth learning models can effectively analyse these aspects. In-depth learning tools such as the multi-level neural network allow for a more accurate classification of heart disease data sets compared to traditional models, as well as the use of various dimensional aids to use an autonomous network to help classify heart problems.

Data Availability

The data shall be made available on request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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