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Prediction of Cardiovascular Disease Using Deep Learning

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Abstract- ***Vascular conditions One of the most prevalent and significant diseases impacting people's health is CVD. Early diagnosis may allow for CVD mitigation or prevention, which may lower death rates. Heart disease, also known as cardiovascular disease, is one of the most serious illnesses in both India and the rest of the globe. According to estimates, cardiac illnesses account for 28.1% of fatalities. Additionally, it will account for a sizable portion of the 17.6 million deaths worldwide in 2021. Therefore, a system that can predict with exact precision and dependability is required for the appropriate and prompt diagnosis as well as the treatment of such diseases. With their powerful approaches, pe could forecast the CVD priory and find their behavioral responses in the massive volume of data. Numerous academics do extensive research utilizing various Deep learning algorithms to predict heart illness using various datasets that contain numerous factors that lead to heart attacks. Machine learning models are a potential method for identifying risk variables. We would want to provide a model that combines many approaches to obtain accurate cardiac disease prediction. Pre-processing and Data Transformation techniques are required to produce accurate data for the training model for the suggested model to be effective. We utilized the utilization of images related to cardiac illness. To allow for comparisons, the findings are presented individually. The study of the results led us to the conclusion that the RFBM and Relief feature selection techniques used in our proposed model generated the maximum accuracy. According to data from a recent poll, the death rate is rising as a result of people's increased use of cigarettes, high blood pressure, cholesterol, and obesity. The aforementioned causes are increasing the disease's severity. The need of the hour is to do researresearchances on these variables and how they affect CVD. Modern methods must be used to organize the illness in its earliest stages and help lower the death rate. The fields of artificial intelligence and data mining offer a vast array of approaches that may be used to forecast CVD priory and spot their behavioral patterns in massive amounts of data. The outcomes of these forecasts will aid physicians in decision-making and early diagnosis, lowering the likelihood that patients would suffer fatalities. The classification, data mining, machine learning, and deep learning models used to predict cardiovascular illnesses are compared and reported in this work. Classification and data mining methods for CVD, machine learning models for CVD, and deep learning models for CVD prediction make up the three sections of the survey. This study also collated and reported on the performance indicators used for reporting accuracy, the dataset utilized for prediction and classification, and the tools used for each category of these procedures.***

Keywords: - **Heart Disease Image Dataset, Image Pre-Processing, CNN, Mobilenet**

I.INTRODUCTION:

The most serious and fatal disease affecting people has been described as cardiovascular disease. A substantial danger and burden are being placed on the world's healthcare systems by the rise in cardiovascular illnesses with high death rates. Cardiovascular disease is more common in males than in women, especially in middle or old age, however, it can also affect youngsters. According to data published by the WHO, heart disease is to blame for one-third of all fatalities worldwide. Around 17.9 million individuals globally die from CVDs each year, with Asia having the highest frequency. According to the European Cardiology Society (ESC), 3.6 million individuals worldwide receive a heart disease diagnosis each year, totaling 26 million cases. About 3% of the overall health care expenditure is spent on treating heart disease, and roughly half of all patients with heart disease pass away after just 1-2 years of diagnosis. There are several tests needed to predict cardiac disease. False projections might be the consequence of medical staff members' lack of experience. Early diagnosis is not always easy. Surgery to treat heart disease is difficult, especially in underdeveloped nations that lack the educated medical personnel, diagnostic equipment, and other resources needed for an accurate diagnosis and treatment of heart disease patients. It would be easier to stop severe heart attacks and increase patient safety if the risk of cardiac failure was accurately assessed. When taught on relevant data, machine learning algorithms can be useful in diagnosing disorders. The comparison of prediction models may be done using publicly available heart disease datasets. Using the vast resources that are accessible, researchers may create the best prediction model with the use of machine learning and artificial intelligence. It has been stressed in recent research that there is a need to lower CVD-related mortality in both adults and children. Proper pre-processing is a vital step since the available clinical datasets are inconsistent and redundant. It is crucial to choose the key aspects that can be included as risk variables in prediction models. To create precise prediction models, care should be made to choose the ideal combination of features and machine learning algorithms. The impact of risk factors that fulffulfill three requirements higof h prevalence in the majority of people; a significant influence on heart disease independently; and the ability to be managed or treated to lower the risks must be assessed. When modeling the predictors for CVD, several studies have taken different risk variables or characteristics into account. According to recent studies, the forecast must have a minimum of 14 qualities to be accurate and dependable to accurately forecast heart disease, researchers are currently having trouble combining these characteristics with the proper Deep learning methods. When deep learning algorithms are trained on relevant datasets, they perform at their peak. The use of feature selection techniques like

data mining, relief selection, and LASSO can assist to prepare the data to offer a more accurate forecast because the algorithms depend on the consistency of the training and test data. Classifiers and hybrid models can be used to forecast the likelihood of illness incidence once the pertinent characteristics have been chosen. Researchers have used a variety of strategies to create hybrid models and classifiers. Limited medical datasets, feature selection, Deep algorithm implementations, and a dearth of in-depth analysis are just a few of the problems that may still prohibit reliable prediction of heart disease. Our study's goals Prediction. Different publicly accessible data sets are used. The developed model had an accuracy of 97.47%, and learning models were evaluated on the picture heart disease dataset. The accuracy of weak classifiers was improved using bagging and boosting approaches, and the performance for heart disease risk detection was deemed good. It was suggested to use the attention mechanism to anticipate the development of cardiovascular illness using a multitask (MT) recurrent neural network. In the work of Tama et al., a two-tier ensemble-based coronary disease (CHD) detection model was suggested. The accuracy, F1, and AUC values for the proposed model are 98.13%, 96.6%, and 98.7%, respectively. A thorough risk model for predicting heart failure mortality was created using an improved random survival forest (iRSF) with good accuracy. For their research, Yadav and Pal used the UCI repository. There are 14 characteristics in this dataset. Four tree-based classification methods were used to carry out the classification. The approaches' accuracy and precision were then contrasted. The final approach delivered the best results. A data mining method has also been used to identify cardiovascular issues**.**

II. Literature survey:

[1] C. Trevisan, G. Sergi, S. J. B. Maggi, and H. Dynamics, ‘‘Gender differences in brain-heart connection,’’ in Brain and Heart Dynamics. Cham, Switzerland: Springer, 2020, p. 937.

The autonomic nervous system, which has sympathetic and parasympathetic branches, is essential for maintaining cardiovascular homeostasis. Autonomic dysregulation plays a key role in the progression of heart failure and the emergence of lethal arrhythmias. Cardiac neuronal control is mediated by several reflex control networks including somata in the intrinsic cardiac ganglia (heart).

[2] M. S. Oh and M. H. Jeong, ‘‘Sex differences in cardiovascular disease risk factors among Korean adults,’’ Korean J.

The socioeconomic status and health behaviors of workers are associated with the risks of developing obesity, diabetes, hypertension, hyperlipidemia, and other cardiovascular diseases. The smoking rate among men was found to be high among teens

and middle-aged men; however, a constant decrease was found in women with an increase in age. Excessive drinking (16 days per month) is highest among male workers in their 40s and 30s and female worker in their 20s….

[3] D. C. Yadav and S. Pal, ‘‘Prediction of heart disease using feature selection and random forest ensemble method,’’ Int. J. Pharmaceutical Res., vol. 12, no. 4, 2020

One of the leading causes of mortality worldwide is coronary artery disease (CAD), sometimes known as heart disease. It is necessary to use strategies that can quickly and effectively extract insight from this data. Compared to other algorithms used in the previous year's efforts, the random forest ensemble technique forecasted superior results.

[4] World Health Organization and J. Dostupno, ‘‘Cardiovascular diseases: Key facts,’’ vol. 13, no. 2016, p. 6, 2016.

Blood is moved around the body through the circulatory system. Cardiac disease, renal and brain vascular disorders, and peripheral arterial disease are among the illnesses that impact the cardiovascular system of the body. The heart and blood arteries are affected by a multitude of illnesses, including angina, arrhythmia, congenital heart disease, coronary artery disease (CAD), heart attacks, heart failure, and pulmonary stenosis.

III . EXISTING WORK

This model highlights an existing technique that was created utilizing certain deep learning techniques. Although machine learning, one of the transfer learning techniques, is used in this procedure, high accuracy could not be achieved.

Drawbacks of the Existing Method

- High complexity.
- Time-consuming.

IV. PROBLEM STATEMENT

We are performing the categorization of either the Plant Leaf Disease detection in the appropriate manner using the Convolution Neural Network (CNN) of deep learning and MobileNet. as methods based on image analysis for finding heart problems. As a result, it's essential to accurately characterize Leaf sickness, which our recommended method will do. A block diagram of the recommended method may be found below.

V . Proposed System

Using the Convolution Neural Network (CNN) of deep learning and MobileNet, we are executing the classification of Plant Leaf Disease detection in the intended approach. as techniques for detecting heart disease based on image analysis. Therefore, accurate characterization of the Leaf illness is crucial, something that our suggested technique will provide.

Advantages:

- Highest accuracy
- Reduces time complexity.
- Better information on Relief features Selection.

System Architecture:

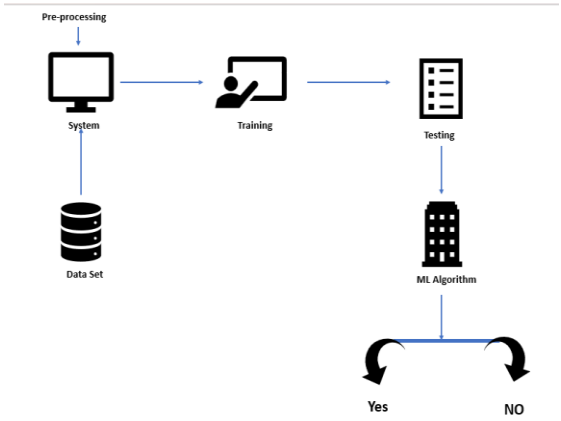


Fig 1: System architecture

VI. METHODOLOGY

Feasibility study:

The feasibility of the project is analyzed in this phase and the business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis, the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, understanding the system's major requirements is essential

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

Economic feasibility:

This study is carried out to check the economic impact that the system will have on the organization. The amount of funds that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system is well within the budget, and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

Technical feasibility:

This study is carried out to check the technical feasibility, that is, the system's technical requirements. Any system developed must not have a high demand for the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

Social feasibility:

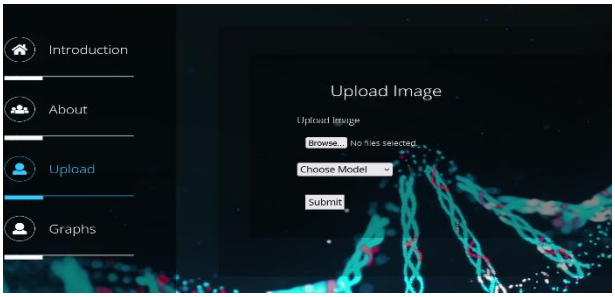
The aspect of the study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods employed to educate the user about the system and make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

Experimental inputs:

Home page:

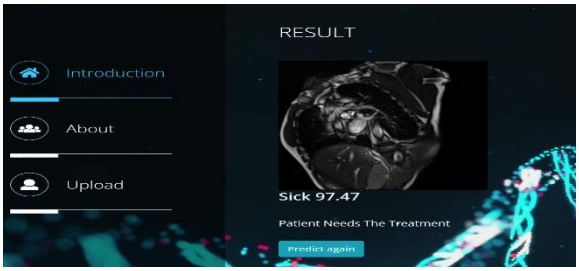
About Page:

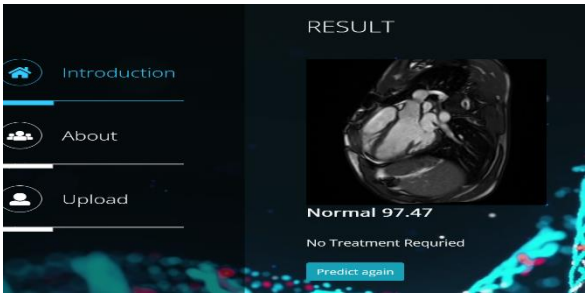
Upload Page:

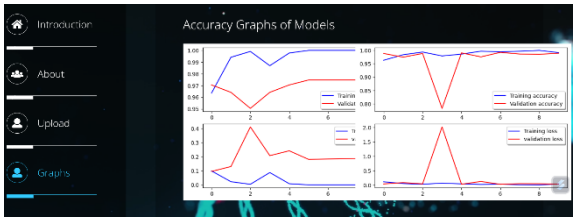


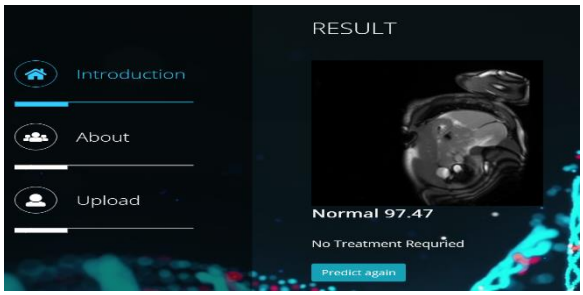
Experimental outputs:

Result pages:









VII. Conclusion

This study takes a similar route, but with an improved and novel method and with a larger dataset for training the model. This research demonstrates that the Relief feature selection algorithm can provide a tightly correlated feature set which then can be used with several machine learning algorithms. The study has also identified that RFBM works particularly well with the high impact features and produces an accuracy, substantially higher than related work. RFBM achieved the best accuracy with 13 features. Cardiovascular disease is used to determine whether or not a patient is at risk of having a heart attack.

VIII. Acknowledgment

We express our deep gratitude to our project guide Dr. D.Thamaraiselvi, under whose valuable guidance the whole work is carried out

IX. References:

[1] C. Trevisan, G. Sergi, S. J. B. Maggi, and H. Dynamics, ‘‘Gender differences in brain-heart connection,’’ in Brain and Heart Dynamics. Cham, Switzerland: Springer, 2020, p. 937.

[2] M. S. Oh and M. H. Jeong, ‘‘Sex differences in cardiovascular disease risk factors among Korean adults,’’ Korean J. Med., vol. 95, no. 4, pp. 266–275, Aug. 2020.

[3] D. C. Yadav and S. Pal, ‘‘Prediction of heart disease using feature selection and random forest ensemble method,’’ Int. J. Pharmaceutical Res., vol. 12, no. 4, 2020.

[4] World Health Organization and J. Dostupno, ‘‘Cardiovascular diseases: Key facts,’’ vol. 13, no. 2016, p. 6, 2016. [Online]. Available: https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases- (CVD)

[5] K. Uyar and A. Ilhan, ‘‘Diagnosis of heart disease using genetic algorithm based trained recurrent fuzzy neural networks,’’ Procedia Comput. Sci., vol. 120, pp. 588–593, Jan. 2017.

[6] A. U. Haq, J. P. Li, M. H. Memon, S. Nazir, and R. Sun, ‘‘A hybrid intelligent system framework for the prediction of heart disease using

machine learning algorithms,'' Mobile Inf. Syst., vol. 2018, pp. 1–21, Dec. 2018.

[7] S. Pouriyeh, S. Vahid, G. Sannino, G. De Pietro, H. Arabnia, and J. Gutierrez, ''A comprehensive investigation and comparison of machine learning techniques in the domain of heart disease,'' in Proc. IEEE Symp. Comput. Commun. (ISCC), Jul. 2017, pp. 204–207.

[8] J. Mourao-Miranda, A. L. W. Bokde, C. Born, H. Hampel, and M. Stetter, ''Classifying brain states and determining the discriminating activation patterns: Support vector machine on functional MRI data,'' NeuroImage, vol. 28, no. 4, pp. 980–995, Dec. 2005.

[9] S. Ghwanmeh, A. Mohammad, and A. Al-Ibrahim, ''Innovative artificial neural networks-based decision support system for heart diseases diagnosis,'' J. Intel. Learn. Syst. Appl., vol. 5, no. 3, pp. 176–183, 2013.

[10] Q. K. Al-Shayea, ''Artificial neural networks in medical diagnosis,'' Int. J. Comput. Sci., vol. 8, no. 2, pp. 150–154,