

Heart Disease Prediction and Prevention System

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Abstract Healthcare research is becoming increasingly important due to advancements in technology and data. Managing large amounts of patient data can be challenging. Big Data Analytics makes it easier to manage this data. There are numerous treatments available globally for various ailments. Machine Learning is an emerging tool for disease prediction and diagnosis. This research demonstrates how machine learning can predict disease based on symptoms. Machine Learning methods, like Naive Bayes, Decision Tree, and Random Forest, are used to forecast disease based on a specified dataset. It is implemented using the Python programming language. An algorithm's accuracy depends on its performance on a certain dataset. Experts in medical image processing and symptom-based disease prediction are in high demand. This research proposes a strategy for predicting and diagnosing cardiovascular illness using ECG analysis and symptom-based detection. The model seeks to become a reliable research tool through future research and development.

Keywords — ECG Classification, Convolutional neural network(CNN), heart diseases

I. INTRODUCTION

At present, when one suffers from a particular disease, then the person has to visit the doctor which is time-consuming and costly too. Also if the user is out of reach of doctors and hospitals it may be difficult for the user as the disease can not be identified. So, if the above process can be completed using an automated program which can save time as well as money, it could be easier for the patient which can make the process easier. There are other Heart-related Disease Prediction Systems using data mining techniques that analyze the risk level of the patient. heart Disease Predictor is a web-based application that predicts the heart disease of the user concerning the symptoms given by the user. heart Disease Prediction system has data sets collected from different health-related sites. With the help of a heart Disease Predictor, the user will be able to know the probability of the disease with the given symptoms. As the use of the internet is growing every day, people are always curious to know different new things. People always try to refer to the internet if any problem arises. People have access to the internet than hospitals and doctors. People do not have immediate options when they suffer from a particular disease. So, this system can be helpful to people as they have the internet access 24 hours. The process for developing a heart disease prediction and prevention system utilizing CNN (Convolutional Neural Network) includes collecting a dataset of medical images linked to heart health. Preprocessing the images to extract features and training the CNN model to identify patterns associated with heart disease.

II. LITERATURE SURVEY

1. Heart disease prediction using image segmentation Through the CNN model

Author: Aman Pant

Description: One of the most fatal diseases is heart disease. This is a condition that affects a big portion of the world's population. When we examine the death rate and the enormous number of people who suffer from heart disease, it becomes clear how critical early detection of heart disease is. There are numerous established approaches for predicting such sickness, but they do not appear to be adequate. There is an immediate need for a medical diagnosis system that can anticipate heart disease early on and provide a more accurate diagnosis than standard approaches such as Logistic Regularization, Lasso, Elastic Network, and Group Lasso regularisation. Nowadays, machine learning approaches are gaining a lot of traction. Convolutional Neural Networks (CNNs) are utilised in this paper to create a system for early stage prediction and medical diagnosis.

2. Novel Deep Learning Architecture for Predicting Heart Disease using CNN

Author: Shadab Hussain

Description: In the last few years, with increased population the most critical component of human life is healthcare. Compare to other deadly diseases, heart disease is one of the most lethal diseases, affecting the lives of millions of people worldwide. It is very important to detect heart disease must early so the loss of lives can be prevented. The availability of enormous amounts of data for medical

diagnostics has aided in the development of complex learning-based models for automated early detection of cardiac problems. The classical machine learning approaches unable to generalize the new data sets which have not been seen in the training set. Therefore, the trained model has less accuracy in prediction stage. To minimize this issue, need to balance between training and testing datasets. This paper proposes a novel deep learning architecture using a 1D convolutional neural network for classification between healthy and non-healthy persons with balanced datasets to reduce the limitations of classical machine learning approach.

3.Heart Disease Prediction using Innovative Decision tree Technique for increasing the Accuracy compared with Convolutional Neural Networks

Author: Chavana Sateesh

Description:The work aims to determine heart diseases using medical parameters of cardiac patients to improve the accuracy rate to predict in advance. **Materials and Methods:** One of the Supervised Learning algorithm is Decision tree algorithm, the widely used one for regression as well as classification issues in the problems raised in machine learning. A subset of deep neural networks is CNN, Convolutional neural network. Two algorithms used in this research work performed with five different datasets at each time to record five samples.

4.Early Screening of Valvular Heart Disease Prediction using CNN based Mobile Network

Author: Tanmay Sinha Roy

Description: The rapid emergence of technology and big data science opened up a significant amount of work that has been carried out in the field of feature extraction and classification techniques of heart sound using various deep learning methods. Practically, medical practitioners use the same old scientific method and practice to seek out any cardiac disorders and predict any abnormality in the human heart. Heart sound normalization, denoising, segmentation, feature extraction, and classification techniques provide a suitable way of study of phonocardiography (PCG) signal analysis which eventually reduces the cost, makes the system compact, simultaneously, can work with extensive training data.

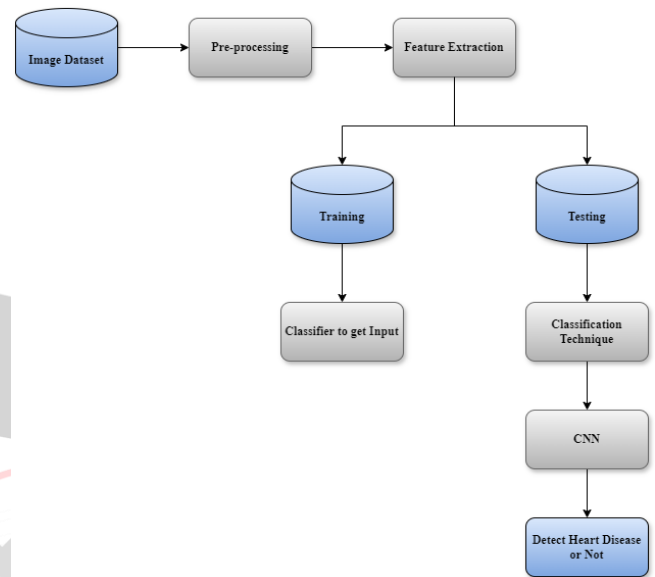
5.Survey of Heart Disease Prediction and Identification using Machine Learning Approaches

Author: Ramya G. Franklin

Description: Heart disease is highlighted as the major one among the various death factors. Detecting heart disease tends to be a bit complex due to insufficient knowledge and experience of the medical practitioners concerning warning signs of heart failure. There exist innumerable data volumes in the healthcare sector. By adopting the best appropriate data mining techniques, early detection of heart-related

diseases can be achieved and also preventing it from occurring. Both the Machine Learning (ML) and Data Mining (DM) techniques prove to be effective and significant in the domain of the medical industry. The objective of the current research work is to examine various risk parameters highlighted in the investigation of Heart disease and also it targets to discover multiple techniques for the identification and prediction of heart disease along with evaluating the drawbacks of the existing work.

III. PROPOSED SYSTEM



1.Dataset: Collecting a dataset of Labeled images of Ecg Signal.

2.Pre-Processing: We use the ecg data to resize the images and remove noise.

3.Feature Extraction: Important features like waveform characteristics are extracted from the ECG signals.

4.Classification: Classification using CNN(Convolution Neural Network) that detect patterns in the ECG signals, helping identify Heart Disease.

IV. TEST RESULT

1.GUI Page:

Test case	Login Screen- Sign up
Objective	Click on sign up button then check all required/ mandatory fields with leaving all fields blank
Expected Result	All required/ mandatory fields should display with symbol "*" Instruction line "*" field(s) are mandatory" should be displayed
Test case	Create a Password>>Text Box Confirm Password>>Text Box
Objective	Check the validation message for Password and Confirm Password field
Expected Result	Correct validation message should be displayed accordingly or "Password and confirm password should be same" in place of "Password mismatch".

2.Login Page:

Login test case

Test Case ID	Test Case	Test Case I/P	Actual Result	Expected Result	Test case criteria(P/F)
001	Enter The Wrong username or password click on submit button	Username or password	Error comes	Error Should come	P
002	Enter the correct username and password click on submit button	Username and password	Accept	Accept	P

3.Registration Page :

Registration test case

Test Case ID	Test Case	Test Case I/P	Actual Result	Expected Result	Test case criteria(P/F)
001	Enter the number in username, middle name, last name field	Number	Error Comes	Error Should Comes	P
001	Enter the character in username, middle name, last name field	Character	Accept	Accept	p
002	Enter the invalid email id format in email id field	Kk@gmail.com	Error comes	Error Should Comes	P
002	Enter the valid email id format in email id field	kk@gmail.com	Accept	Accept	P
003	Enter the invalid digit no in phone no field	99999	Error comes	Error Should Comes	P
003	Enter the 10 digit no in phone no field	9999999999	Accept	Accept	P

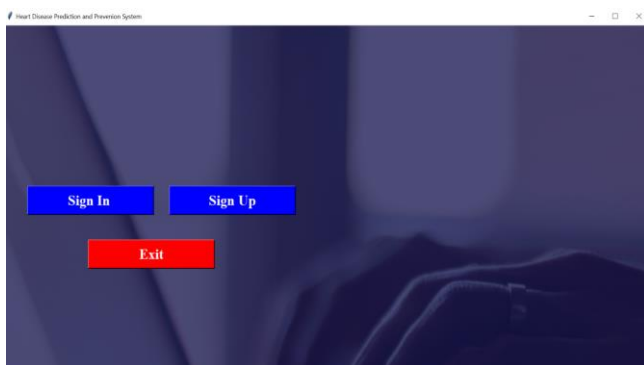
4. Main Page :

System Test Cases:

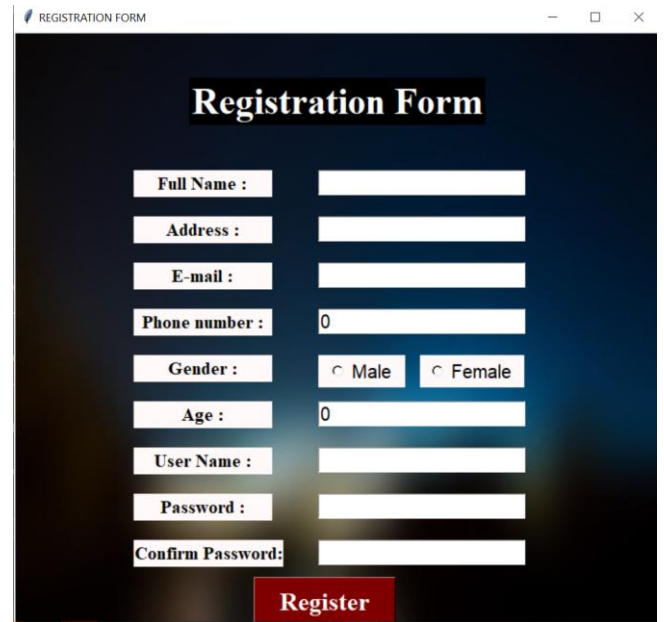
Test Case ID	Test Case	Test Case I/P	Actual Result	Expected Result	Test case criteria(P/F)
001	Store Xml File	Xml file	Xml file store	Error Should come	P
002	Parse the xml file for conversion	parsing	File get parse	Accept	P
003	Attribute identification	Check individual Attribute	Identify Attributes	Accepted	P
004	Weight Analysis	Check Weight	Analyze Weight of individual Attribute	Accepted	P
005	Tree formation	Form them-Tree	Formation	Accepted	P
006	Cluster Evaluation	Check Evaluation	Should check Cluster	Accepted	P
007	Algorithm Performance	Check Evaluation	Should work Algorithm Properly	Accepted	P
008	Query Formation	Check Query Correction	Should check Query	Accepted	P

V. RESULTS

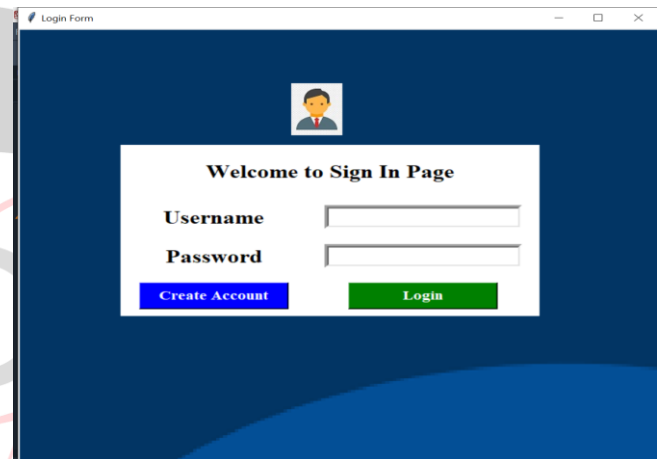
1.Main Page :



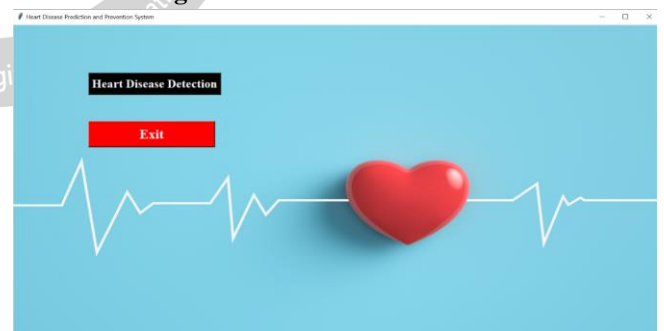
2.Registration Page :



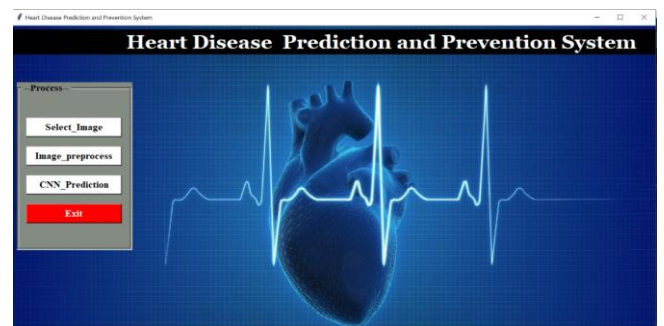
3.Login Page:



4.GUI Main Page:



5.GUI Master Page:



VI. CONCLUSION

The Heart Disease Prediction and Prevention System, which uses CNN technology, provides a robust technique to analyze medical data for early detection and intervention. The CNN method, which uses convolutional layers, pooling layers, and activation functions, may successfully extract critical features and patterns from patient data and forecast the likelihood of cardiac disease. Through extensive training and feature extraction, the system may deliver precise risk assessments, allowing healthcare providers to execute preventive tactics and individualized therapies. Finally, this CNN-based approach improves patient outcomes by allowing for faster interventions, increasing proactive health management, and lowering the burden of heart-related illnesses.

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