

Prediction of Heart Disease Using Bio-Inspired Algorithms

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Abstract

Background: The project work entitled as Prediction of Heart Disease using Bio-Inspired Algorithms, basically, the main objective of this project is a huge number of deaths are occurring not only in India but in the whole world due to heart disease. Heart related diseases or Cardio vascular Diseases has emerged as the most life-threatening disease. So, there is a need of reliable, accurate and feasible system to diagnose such diseases in time for proper treatment. Machine learning algorithms like Genetic, BAT and BEE algorithms have been applied to different medical datasets to automate the analysis complex data. In recent times, we have been using several machine learning techniques to help the health care industry and the professionals in the diagnosis of heart related diseases.

Objectives: In this Prediction of Heart Disease using Bio-Inspired Algorithms, we are going to predict accurately the presence of heart disease with few tests and attributes. Attributes are considered from the primary basis for tests and give accurate results. Many more input attributes can be taken, but our goal is to predict with few attributes and with faster efficiency the risk of having heart disease.

Conclusions: Thus, the system is GUI-based, user-friendly, reliable, scalable and an expandable system. This model can also help in reducing treatment costs by providing the Initial diagnostics in time. General physicians can utilize this tool for initial diagnosis of cardio- patients. It also helps in reducing treatment costs by providing the initial diagnostics in time.

Keywords: User, Dataset, Attributes

1. Introduction

Over the last few decades heart disease remains primary basis of death worldwide. An estimation is done by the World Health

Organization, that over 17.9 million deaths occur every year worldwide because of cardiovascular disease, and of these deaths, 80% are because of coronary artery disease and

cerebral stroke. Many factors such as personal, professional habits and various habitual risk factors such as over consumption of oily food, stress or tension, overuse of alcohol along with physiological factors like high blood sugar, heart rate at rest, high blood pressure, high blood cholesterol, etc. The efficient and early medical diagnosis of heart disease plays a crucial role in taking preventive measures to prevent death cases in the world. Machine learning is one of the most rapidly evolving domains of artificial intelligence. Data Mining is the process of extracting valuable data from huge datasets. The genetic algorithm is a method for solving both the constrained and unconstrained optimization problems that is based on natural selection.

The main aim of Prediction of Heart Disease using Bio-Inspired Algorithms is to predict the risk of heart disease with the help of few tests and attributes by comparing dataset with Genetic, BAT and BEE algorithms to get better and accurate results. We consider the heart disease dataset which contains 14 attributes and 4 class labels and the stages are predicted as 0,1,2 and 3 where 0 refers to No heart Disease, 1 refers to stage1 disease, Stage2 and Stage3 refers stage 2 and Stage3 diseases.

2. Objectives

Firstly, we use the Ant Colony Optimization (ACO) method to predict the heart disease,

ACO Algorithm predicts the risk of heart disease by using the pheromone value. But it doesn't provide accurate results. The main disadvantages of existing systems are,

- Different prediction results on different datasets
- Detection is not possible at a very early stage
- It takes huge time.
- Less accurate

The prediction of Herat Disease is being created to overcome the disadvantages of existing system like less accuracy, different prediction results, etc. Moreover, it helps by implementing Genetic, BAT and BEE algorithms. This optimized algorithms will be applied on dataset to check whether all values are related to dataset or not, if any attribute found unrelated then it will remove from dataset. The advantages of proposed system are,

- High Performance
- Time saving. • Accurate information.

3. System Components

There are four system components or modules in this project. The four system modules are,

1. Dataset and Data Analysis
2. Model Selection and Implementation
3. Data Comparison
4. Data Visualization

1. Dataset and Data Analysis

Firstly, admin has login and will upload dataset into system. After uploading the admin can even train machine learning approach. The data pre-processing in Machine Learning is an important step that helps enhance the quality of data to extract the meaningful input from the data.

Data Analysis is the process of transforming and modeling data to discover useful information, business decision-making. Usually, the result of data analysis is the detailed report.

2. Model Selection and Implementation

It selects one final machine learning model from a collection of candidate machine learning models for a training dataset and implements it on the dataset.

3. Data Comparison

The data is analyzed with different testing parameters, and it is compared with the test data created by the user.

4. Data Visualization

Data Visualization, is graphical representation of information and data. It is a visual content through which people understand significance of data. Using visual elements like graphs these provide access to understand patterns.

4. System Design

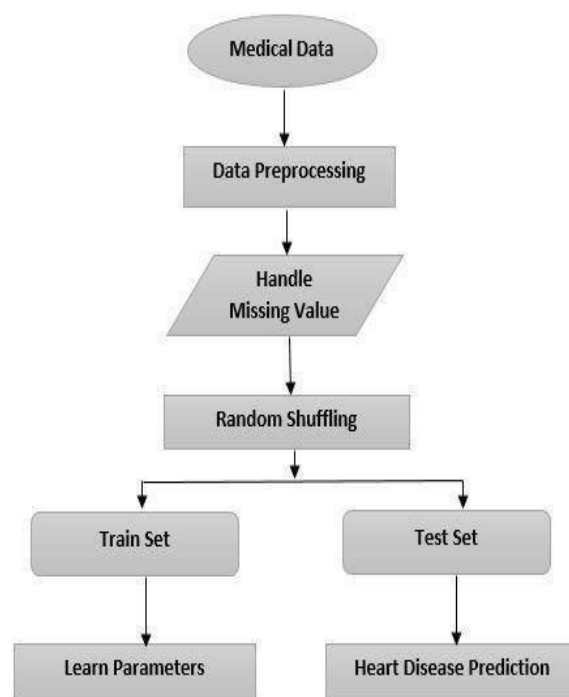


Fig 1. System design for Prediction of Heart Disease Using Bio-Inspired Algorithms.

In this project, first we have to collect the medical data of patients and create a dataset then process the data. If any attribute is found unrelated, those will be removed from the dataset. Random shuffling of dataset is done in two ways i.e., Train set and Test set and predicts the risk of heart disease.

5. System Requirements

The functional requirements are,

- **Upload Dataset:** Admin will login to the system and upload the dataset.
- **GUI Implementation**
- **Analysis and Comparison:** Bio-Inspired algorithms are analyzed and then

compared to know which algorithm provides better accuracy.

- **Prediction:** Based on the dataset it predicts the stage of heart disease.

The non-functional requirements are,

- **Reliability:** The application should be highly reliable and it should generate all the updated information in correct order.
- **Maintainability:** Maintainability involves a system of continuous improvement - learning from the past in order to improve the ability to maintain systems, or improve reliability of systems based on maintenance experience.
- **Portability:** The application should be portable on any system.
- **Performance:** The system will be encouraged on a single web server with a lone database server outside of anyone's ability to see, execution transforms into a significant concern.

6. Results and Discussions

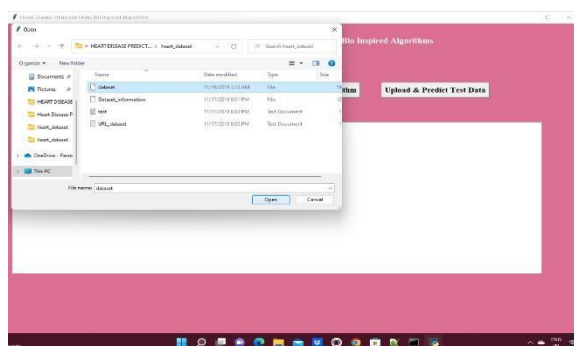


Fig 2. Uploading Dataset

Firstly, we have to upload the dataset into the system.

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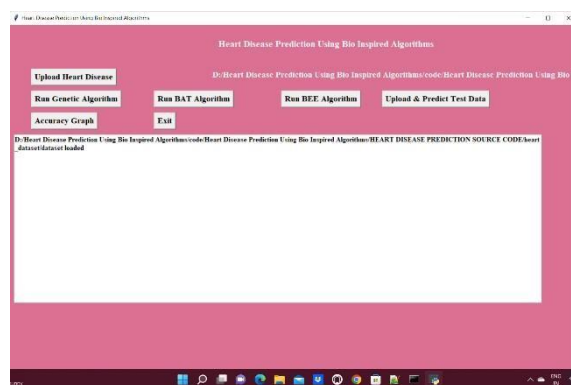


Fig 3: The dataset has been uploaded in the above screen.

After uploading the dataset, Genetic, BAT and BEE algorithms are performed to find the accuracy of algorithms. According to the dataset accuracy rate differs. Next, we have to upload the test file (fig 2) which contains test data without class label, after uploading it predict the stage of heart disease.

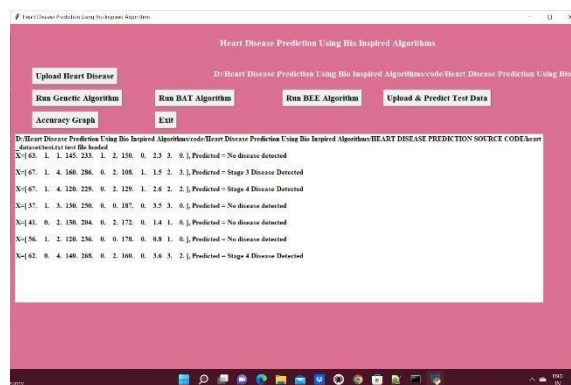


Fig4: Predicts the Stage of Heart Disease

We have to run Genetic, BAT and BEE algorithms, then upload and predict test data. By upload and predict test data It detects the stage of heart disease.

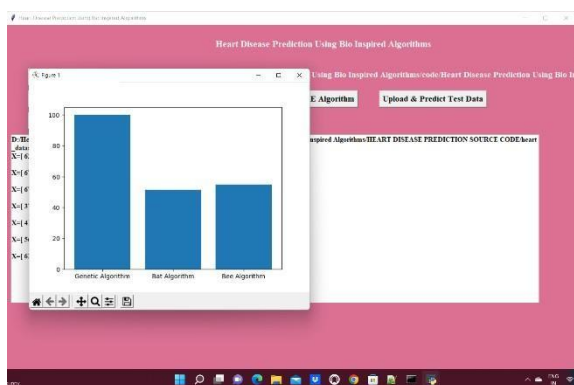


Fig 5: Accuracy Graph

In the above graph x-axis represents Algorithm Name and y-axis represents accuracy of those algorithms. Genetic Algorithm will give more accuracy when compared to BAT and BEE algorithms.

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