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Recommendation of Drug and Food for Major Cardiac Diseases

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Abstract

The heart serves a crucial role in living things. Greater precision, fineness, and accuracy are required for the diagnosis and prognosis of heart disorders because even a small error might lead to exhaustion or death. Heart-related deaths occur often, and the rate of increase is accelerating. About one person dies from heart disease every minute in the modern era. The goal of this study is to recommend proper drug and food to majorly attacking heart diseases. Here in this research, we are using machine learning algorithm to suggest the medicine and nutrition for corresponding heart disease considering the symptoms given by the user. The speedy advancement of technology has led to remarkable rise in mobile health technology that being one of the web applications. This research includes datasets considering both male and female categories with all the age groups. The machine learning algorithm we used in this research is Decision Tree algorithm. This algorithm is based on a single attribute through which corresponding drug and food can be recommended.

KEYWORDS: Decision Tree Algorithm, Heart Attack, Heart Stroke, Arrhythmia, Food recommendation, Drug recommendation.

Introduction

The work proposed in this paper focus mainly on various data set that contains drug and related food need to be taken when employed in different types of majorly occurring heart diseases. Human heart is the main part of the human body. It generally regulates the blood flow all through a human body. Any irregularity to heart cause distress in other parts of the body. Any sort of disturbance to normal functioning of heart can be classified as a heart disease. In today's contemporary world, heart disease is one of the major reasons for occurrence of high number of deaths. An unhealthy life style can be a reason for the occurrence of heart diseases. Some of the habits that may result in occurrence of hyper tension are Smoking, taking alcohol., etc. According to the World health organisation more than 10 million

die due to heart diseases every single year around the world. A healthy lifestyle and earliest detection are only ways to prevent heart related diseases.

Heart diseases

Heart failure is a disorder that worsens over time as the body's ability to pump enough blood to meet its needs is gradually lost. This can happen as a result of heart attacks or high blood pressure, which injures the heart's muscle. The heart can be harmed in two different ways: either it becomes stiff and unable to fill with blood sufficiently, or it becomes weak and unable to pump blood (this condition is known as systolic heart failure) (we call this situation diastolic heart failure). Both diseases ultimately result in the retention of excess fluid or congestion. So, we refer to congestive heart failure when individuals

start to exhibit symptoms. Because symptoms are sometimes confused for aging-related problems, many people do not even aware they have it. Heart failure does not occur suddenly it starts slowly and gets worse over time.

When blood cannot flow to the brain, a stroke happens. The obstruction or rupture of a blood vessel in the brain, which both restrict oxygen from reaching the brain tissue, is what usually causes this disturbance of blood flow. If this occurs, the patient's chances of recovering are reduced as oxygen-starved brain cells start to die. A heart arrhythmia is an irregular heartbeat. When the electrical signals that control how often the heart beats are coordinated improperly, heart rhythm issues (heart arrhythmias) result. The heart beats excessively quickly (tachycardia), too slowly (bradycardia), or irregularly as a result of the poor signalling. Heart arrhythmias, which may be completely safe, sometimes feel like your heart is speeding or fluttering. However, some heart rhythms can result in unwelcome — and perhaps even life-threatening — symptoms.

Symptoms

Symptoms of Heart Failure:

Although heart failure may strike at any age, it is more common in people as they get older, making age an important risk factor. The risk of heart failure increases dramatically after the age of 65.

- High Blood Pressure (Hyper Tension).
- Fat deposits creating blockages in heart arteries (coronary artery disease)
- Heart Attack (myocardial infarction)

Symptoms of Heart Stroke:

Stroke symptoms are the direct result of brain cells dying due to a lack of oxygen.

- Unexpected dizziness or loss of balance that makes walking or other physical activities difficult

- Weakness or numbness in limbs or face — often only on one side of the body
- A severe headache
- Unusual blurriness in one or both eyes

Symptoms of Arrhythmia:

Any health issue that affects how the heart works can increase the risk of arrhythmias.

- Advancing age
- High blood pressure
- Obesity
- Diabetes

Statistics

Heart Failure Statistics:

- Nearly 26 million around world are currently living with congestive heart failure (CHF).
- Approximately 9,50,000 new cases are diagnosed in the world each year.
- Congestive heart failure affects people of ages, from children and young adults to the middle-aged and early.
- Almost 1.4 million persons with CHF are under 60 years of age.
- More than 5 percent of persons age 60 to 69 have CHF.

Heart Stroke Statistics:

- In 2021, 1 in 6 deaths from cardiovascular disease was due to stroke.
- Every year, more than 15,95,000 people in the world have a stroke. About 10,10,000 of these are first or new strokes.
- About 87 percent of all strokes are ischemic strokes, in which blood flow brain is blocked.
- Stroke is leading cause of serious long-term disability. Stroke reduces mobility in more than half of stroke survivors age 65 and older.

Arrhythmia Statistics:

- The prevalence of arrhythmias is expected to be 1.5 percent to 5 percent in general population, with

atrial fibrillation being the most common.

- According to the centres of Disease control and Prevention (CDC), approximately 2 percent of people younger than 65 years old have Atrial Fibrillation, while about 9 percent of people ages 65 older have arrhythmia.
- World Wide, the estimated number of individuals with atrial fibrillation in 2021 was 33.5 million. That is about 0.5 percent of the world's population.

Precautions

- Eat an overall Healthy dietary pattern that emphasizes a variety of fruits and vegetables, whole grains, low-fat dairy products, skinless poultry and fish, nuts and legumes, and non-tropical vegetable oils, Also, limit saturated fat, trans fat, cholesterol, sodium, red millets, sweets and sugar-sweetened beverages.
- Take 15 to 20 minutes a day to sit quietly, breathe deeply and think of a peaceful scene. Or try a class in yoga or meditation.
- Monitoring blood pressure at home, in addition to regular monitoring in a doctor's office, can help control High Blood Pressure.
- Healthy diet, regular physical activity, and not using tobacco products are the keys to prevention.
- Checking and controlling risk factors for heart stroke such as high blood pressure, high cholesterol and high blood sugar or diabetes is also very important.
- Avoid drinking alcohols, it decreases your risk of having another stroke.

Literature Reviews:

[1] Benjamin Stark, Florida Polytechnic University, Lakeland, USA. Medicine recommender systems can assist the

medical care providers with the selection of an appropriate medication for the patients. The advanced technologies available nowadays can help developing such recommendation systems which can lead to more concise decisions.

[2] Weiqing Min. A growing proportion of the global population is becoming overweight or obese, leading to various diseases (e.g., diabetes, ischemic heart disease and even cancer) due to unhealthy eating patterns, such as increased intake of food with high energy and high fat. Food recommendation is of paramount importance to alleviate this problem.

[3] D.S.Gaikwad. Synthesizing, analysing the patterns, relations and rules among the data known to be as mining. Extraction is basically done by the process of extracting useful relations and patterns from the massive database that is where the database is stored in data warehouses. Proposed system does the same work as the methodology of data mining that is finding relations and patterns among the data. By implementing advanced techniques in data mining like machine learning it would enhance the scope of the system.

[4] Thi Ngoc Trang Tran. Recently, food recommender systems have received increasing attention due to their relevance for healthy living.

Proposed System:

We performed heart disease classification using the data provided from the UCI repository using the Python complete stack and system operations after reviewing the outcomes from the existing approaches. It offers a simple to understand visual representation of the dataset, working environment, and predictive analytics development. Pre-processing data is the first step in the machine learning (ML) process, which is then followed by feature selection based on data cleaning, classification, and performance evaluation. To increase the accuracy of the outcome, the random forest technique is utilised.

Advantages:

1. Improves the ability to diagnose heart problems with more accuracy.
2. Lessen the burden on doctors' time.
3. affordable for patients.

Background Work:

Existing System:

The patient provides the input information for this system. Heart illness is then analysed using ML algorithms from the user inputs. The generated findings are now contrasted with the outcomes of other models that have been used in the same domain and are determined to be improved. With the use of NN, DT, SVM, and Nave Bayes, patterns are found in the data of heart disease patients collected from the UCI laboratory. The performance and accuracy of the output using various methods are compared. The suggested hybrid method competes with the other current methods, providing values for the F-measure of 87%.

Disadvantages:

Separate recommendation for food and medicine is there for heart diseases.

Methodology:

DATASETS CREATION: As we are working on three majorly occurring heart diseases, we are considering three different datasets i.e., dataset for Heart Failure, Heart attack, Arrhythmia. Each dataset further divided into 2 categories males and female. Both these categories are then separated considering all three age groups. When the user enters his/her details like name, gender, age, and symptoms the system recommends the corresponding drug and food considering one attribute like gender. Based on that attribute, system will verify with the symptoms present in the given age group. If the symptoms in the dataset matched with the user's reported symptoms, then the system displays corresponding drug and food to the patient

or the user. Sample datasets look as follows.

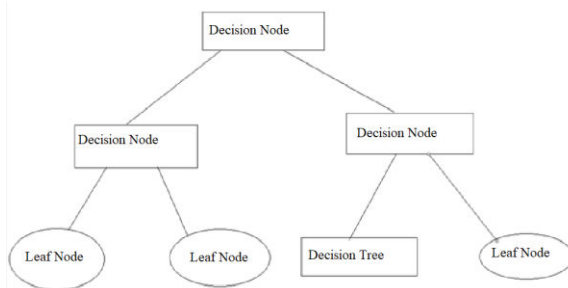
MALE			FEMALE		
Child	Adult	Old	Child	Adult	Old
Symptom 1 Symptom 2	Symptom 1 Symptom 2	Symptom 1 Symptom 2	Symptoms	Symptoms	Symptoms
Drug	Drug	Drug	Drug	Drug	Drug
Food	Food	Food	Food	Food	Food

Dataset

Like the data set about three datasets for Hearts failure, Heart attack, Arrhythmia are created. In these datasets symptoms that appear for different age group people are mentioned and for the respective symptoms corresponding drug and food to be taken are also mentioned such that the system displays the drug and food considering gender, age, and given symptoms. If the given symptoms are not satisfied with the symptoms in one dataset, then the system verifies considering another dataset. In this way proper drug and food are recommended.

Initially, user enters all the personal details along with the symptoms. Based on Decision Tree Algorithm, it verifies the user details. If the user is male, it verifies symptoms under the three age groups under this category. If the user is a child, then it verifies whether the given symptoms match with the symptoms in the original dataset. If the symptom does not match then symptoms in another dataset are verified. If the symptom matches then the corresponding drug and food present in the original dataset are displayed. Similarly, the system verifies with the symptoms in other age groups, females, and other datasets also. The algorithm used for this paper is Decision Tree Algorithm.

Decision Tree Algorithm:
dresponse(Yes/No).



The most important thing to keep in mind while developing a machine learning model is to select the optimal method for the dataset and task at hand. The two benefits of employing a decision tree are listed below.

Decision trees are typically designed to resemble how people think when making decisions, making them simple to comprehend. Because the decision tree displays a tree-like structure, the rationale behind it is simple to comprehend.

Root Node: The decision tree begins at the root node. The full dataset is represented, which is then split into two or more homogeneous sets.

Leaf Node: After receiving a leaf node, the tree cannot be further divided; leaf nodes are the ultimate output nodes.

Splitting: In splitting, the decision node or root node is divided into sub-nodes in accordance with the specified conditions.

Branch/Sub Tree: The tree formed by splitting the tree is called Sub tree or Branch.

Pruning: Pruning is the procedure of removing the tree's undesirable branches.

Parent/Child node: The parent node of the tree and the remaining nodes are referred to as the child nodes.

In a decision tree, the algorithm begins at the root node and works its way up to forecast the class of the given dataset. This algorithm follows the branch and jumps to the following node by comparing the values of the root attribute with those of the record (real dataset) attribute. For the next node, the algorithm again compares the attribute value with the other sub-nodes and move further. It continues the process until it reaches the leaf node of the tree. The

complete process can be better understood using the below algorithm:

Step-1: Start with the root node of the tree, which has the entire dataset.

Step-2: Utilize Attribute Selection Measure to identify the dataset's top attribute (ASM).

Step-3: Subsets of the root node that include potential values for the best qualities should be created.

Step-4: Create the best attribute-containing decision tree node.

Step-5: Using the subsets of the dataset generated in step 3, repeatedly design new decision trees. Continue along this path until you reach a point when you can no longer categorise the nodes and you refer to the last node as a leaf node.

Advantages of Decision Tree:

- It is easy to comprehend since it uses the same reasoning process that people use when making decisions in daily life.
- It can be quite helpful for resolving decision-related issues.
- It is beneficial to consider every scenario that could result from an issue.
- Compared to other methods, less data cleaning is necessary.

Disadvantages of Decision Tree:

- The decision tree is complicated since it has many layers.
- Random Forest algorithm can fix any overfitting problems it may have.
- The decision tree's computational complexity might rise with more class labels

Result:

When a user enters his/her required details with symptoms the system will generate the corresponding drug and food alternatively. The usage of drug at required times and intake of food that was recommended can help the user get out of the disease they are facing.

Machine learning algorithms plays a vital role in prediction and classification models. So, to recommend the proper drug or

medicine and food for the respective heart disease, we used Decision Tree in machine learning algorithms. The system is designed in such a way that the datasets are collected for different age groups. After verifying the age, it checks whether the symptom exists in corresponding age group or not then the system displays the names of drug and food for the symptoms entered.

Conclusion:

We discussed the method for predicting heart disease and providing medication and dietary recommendations in the research study. A hybrid dataset is then applied after a method for choosing feature information gain is given. This proposed working paradigm can help reduce treatment costs by providing an early diagnostic using food and medication via a web application. To reach this strategy and methodology, many people fight against many, multiple reasons of cardiac problems. The findings demonstrate the model's strong performance across all three-heart disease concern rating markers. Whenever a person searches for food and drug interactions related to their symptoms, so that there is no risk to the patient's life.

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