



Machine Learning Algorithms To Detect Heart Disease

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ABSTRACT

The growth of the computer science field is very impressive in the current world. The number of diseases that afflict man has increased exponentially, more than his life, due to his current activities. Due to the current practices of human life and activities without sufficient labor, the number of diseases that affect him is increasing, and his life expectancy is also decreasing. The aim of this study is to use the current developments in the field of computer science to try to solve the symptoms of diseases that occur in human life and the methods that help to solve them. Heart-related diseases are the most common cause of death in the world today. To easily detect and resolve these effects, we can use machine learning algorithms in current scientific discoveries to monitor these diseases and try to correct them at an early stage. By using machine learning algorithms, it is possible to easily detect symptoms of the disease and obtain accurate results.

Introduction:

The number of lifespans in human life is gradually decreasing. In the early days, the number of people who exceeded 100 years of age and were approaching 100 years of age was higher. However, the lifespan of a living human being is decreasing due to the development of countless diseases and our activities that are also contributing to it. Apart from the unhygienic conditions we accept in our lives, unhealthy food choices and selfish plans to increase human income affect everyone. Due to the selfish life of every human being, this world is facing various difficulties and the extinction of various living beings. Current diseases are affecting people from young to old. Childhood losses are increasing. In today's world, the incidence of heart-related diseases is high and the cause of most deaths is high. With the current development of the computer industry, we will be able to monitor the nature of the diseases we face in life and use alternative measures for them. The development of the field of information technology has made it a simple way to operate very easily and obtain clear information. With the help of artificial intelligence and learning algorithms, which are the main activities of the computer science field today, we can get accurate results. Through this, we can get easy results from the data and thereby provide quick actions to the impact of diseases.

Review of Literature:

Heart disease is a life-threatening disease in today's world. Heart disease is a major cause of many sudden deaths. Heart attack is currently a disease that can affect people of all ages and is a cause of sudden death. Heart disease is the cause of one-third of deaths worldwide. Heart disease can also be called cardiovascular disease, though that term covers blood vessels problems as well. Several components of your heart and circulatory system, including as the arteries that transport blood to and from the heart and the valves that open and close to maintain blood flow in the proper direction at the appropriate time, can be impacted by heart disease. Blood vessels, the coronary arteries, become blocked when you have coronary artery disease (CAD). Your heart muscle may receive less blood flow as a result, depriving it of the oxygen it requires. Atherosclerosis, often known as artery stiffening, is typically the first cause of the condition. Plaque deposits accumulate in your arteries as a result of that disorder, frequently over several years. Angina, or chest pain, is a symptom of coronary heart disease that can cause a heart attack. Other cardiac issues like irregular heartbeats or heart failure may also be exacerbated by it.

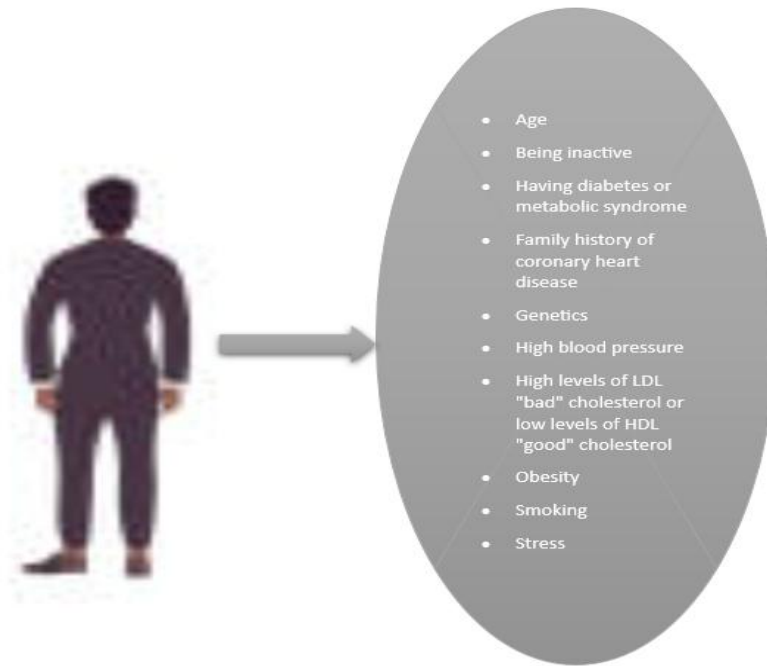


Figure-1 Reason for Heart Disease

The types of heart problems can be found as follows:

Heart Arrhythmias: When you have an arrhythmia, your heart beats too fast, too slow, or in an irregular, uneven pattern. Some arrhythmias are harmless. But others can put you at a serious risk of problems such as cardiac arrest and stroke. They may also cause symptoms like dizziness and fainting. Serious arrhythmias often develop from other heart problems but may also happen on their own. You're at higher risk if you smoke, drink alcohol, or have health problems such as obesity, high blood sugar, or sleep apnea.

Heart Failure: With heart failure, your heart doesn't pump blood as well as it should to meet your body's needs. It is usually caused by CAD, but it can also happen because you have thyroid disease, high blood pressure, heart muscle disease (cardiomyopathy), or certain other conditions.

Heart Valve Disease: Your heart has four valves that open and close to direct blood flow between your heart's four chambers, the lungs, and blood vessels. An abnormality could make it hard for a valve to open and close the right way. When that happens, your blood flow could be blocked or blood can leak.

Endocarditis: This is an infection that's usually caused by bacteria, which may enter the blood and take root in your heart during illness, after surgery, or after using IV drugs. It often happens if you already have valve problems. Antibiotics can usually cure it, but the disease is life threatening without treatment. If your heart valves are seriously damaged as a result of endocarditis, you may need valve replacement surgery.

Rheumatic heart disease: This condition develops when your heart muscle and valves are damaged by rheumatic fever, which is linked to strep throat and scarlet fever. Rheumatic heart disease was more common in the past. But doctors are now able to prevent it by using antibiotics to treat the diseases that lead to it. If you do get it, the symptoms usually show up many years after the infection.

Pericardial Disease: Any disease of the pericardium, the sac that surrounds your heart, is called a pericardial disease. One of the more common diseases is pericarditis or inflammation of the pericardium.

Cardiomyopathy: Cardiomyopathy is a disease of your heart muscle, or myocardium. It gets stretched, thickened, or stiff. Your heart may get too weak to pump well.

Congenital Heart Disease: Congenital heart disease happens when something goes wrong while the heart is forming before birth. The heart abnormality sometimes leads to problems right after birth, but other times, there aren't any symptoms until adulthood. Septal abnormalities are among the most common congenital heart problems. These are holes in the wall that separates the left and right sides of your heart. You can get a procedure to patch the hole. Another type of abnormality is called pulmonary stenosis. A narrow valve reduces the flow of blood to your lungs. A procedure or surgery can open or replace the valve. In some babies, a small blood vessel known as the ductus arteriosus doesn't close up at birth as it should. When this happens, some blood leaks back into the pulmonary artery, which puts strain on the heart. Doctors can treat this with surgery or a procedure or sometimes with medication.

Research Methodology:

A neural network consists of artificial neurons, also known as nodes. These nodes take the information to the next level. Information exchange in the next stages and calculation we use various methods to get the results we need. Using Project we give simple but accurate results

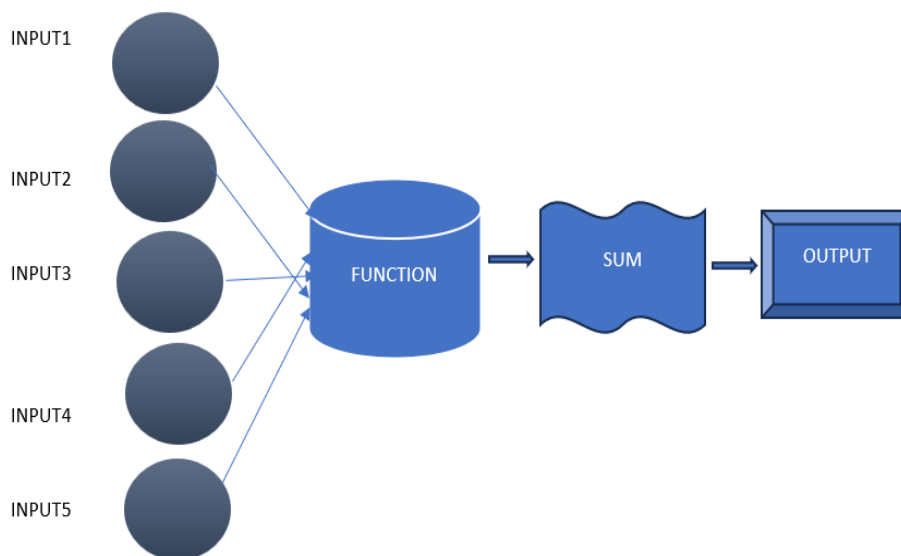


Figure 2 Neural Networks Functions

Proposed methodology:

The prevalence of diabetes in the developing world is increasing. In this too, the number of Type 2 diabetic patients is increasing very much. It is important to find a solution to this diabetic syndrome or to easily detect and solve the symptoms of the disease.

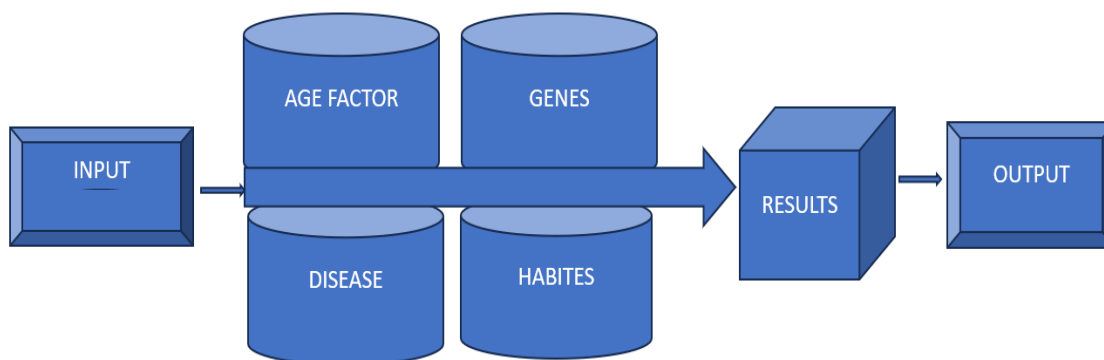


Figure 3 Disease identification Process

Stage 1:Heart disease affects people of all ages, especially the elderly.Cardiac disease affects middle-aged and elderly people the most, leading to death or significant economic costs and impairing their health.Four or five out of ten deaths from heart disease are caused by this disease

$$\text{Age} = \sum \text{Children} \text{ or } \sum \text{Youth} \text{ or } \sum \text{Adults} \text{ or } \sum \text{Seniors}$$

- Age 1 to 14 _____> Children
- Age 15 to 30 _____> Youth
- Age 25 to 64 _____> Adults
- Age 65 to n _____> Seniors

Stage 2:Heart disease is most likely passed down to us through our ancestors.The impact of disease transmission has been passed down through our ancestors.We need to change our habits, knowing that diseases can be transmitted to us through our ancestors and our parents.

$$\text{Genes} = \sum \text{FA or } \sum \text{MO or } \sum \text{CR or } \sum \text{NI}$$

- FA → Father
- MO → Mother
- CR → Close Relatives
- NO → Normal

Stage 3:Heart disease can worsen existing illnesses and cause significant morbidity and mortality, as well as economic loss.When we have diabetes, its effects can greatly affect our heart, leading to heart disease and even death.Blood pressure and cholesterol are other factors that make us more likely to develop heart disease or a heart attack.

$$\text{Disease} = \sum \text{DI or } \sum \text{HD or } \sum \text{BP or } \sum \text{CH or } \sum \text{NI}$$

- DI → Diabetics
- HE → Heart Disease
- KI → Blood Pressure
- OS → Cholesterol
- Ni → Nil

Stage 4:Our dietary habits often contribute to heart disease without us realizing it. Our smoking and drinking habits affect our physical health and are a major cause of heart-related diseases. Stress can also affect our hearts. In the current younger generation, this stress is more work-related than family-related. Our current eating habits are having a major impact on our health and are a major cause of heart disease.

$$\text{Disease} = \sum \text{SM or } \sum \text{DR or } \sum \text{ST or } \sum \text{FH or } \sum \text{NI}$$

- SM → Smoking
- DR → Drinks
- ST → Stress
- FH → Food Habits
- Ni → Nil

Finally, it is our duty to change our eating habits and avoid any bad habits to protect ourselves from diseases. I can learn how heart disease can affect us according to the above methods. To avoid heart disease, we can classify its causes and compare them. The aim of this article is to enable us to monitor our health with accurate data. we can use these fourcategories to find out the nature of heart disease.By monitoring the patient's condition at every stage, this proposed technology through heart patient's condition is monitored and treatment is provided to the patient

For 1 to 4 (Children, Youth, Adults, Seniors)

For 1 to 4 (FA, MO, CR, NI)

For 1 to 5(DI, HD, BP, CH, NI)

For 1 to 5 (SM, DR, ST, FH, NI)

Finally, we got result in

$$\text{OU} = \text{Childran} + \text{FA} + \text{DI} + \text{SM}$$

$$\text{OU} = \text{Seniors} + \text{CR} + \text{CH} + \text{FH}$$

$$\text{OU} = \text{seniors} + \text{NI} + \text{NI} + \text{NI}$$

Result & Discussion:

The results obtained by these methods are not only easy to diagnose the disease but also accurate.Using these methods can provide treatment based on data from excessive results.Our implementation provides more accurate results than the old algorithm

TECHNIQUES	ACCURACY (%)	ERROR (%)
FNN	0.80	20
MACO-CNN	0.88	12
MDLA	0.92	8
MDH	0.95	5

Table -1 Heart disease Comparison chart

This algorithm provides better result than the FNN(Feedforward Neural Networks algorithms),MACO-CNN(Modified Deep Learning Algorithm),MDLA(Modified Deep Learning Algorithm).This algorithm defines easily identify of results;these can provide immediate treatment to the patient as per our got results

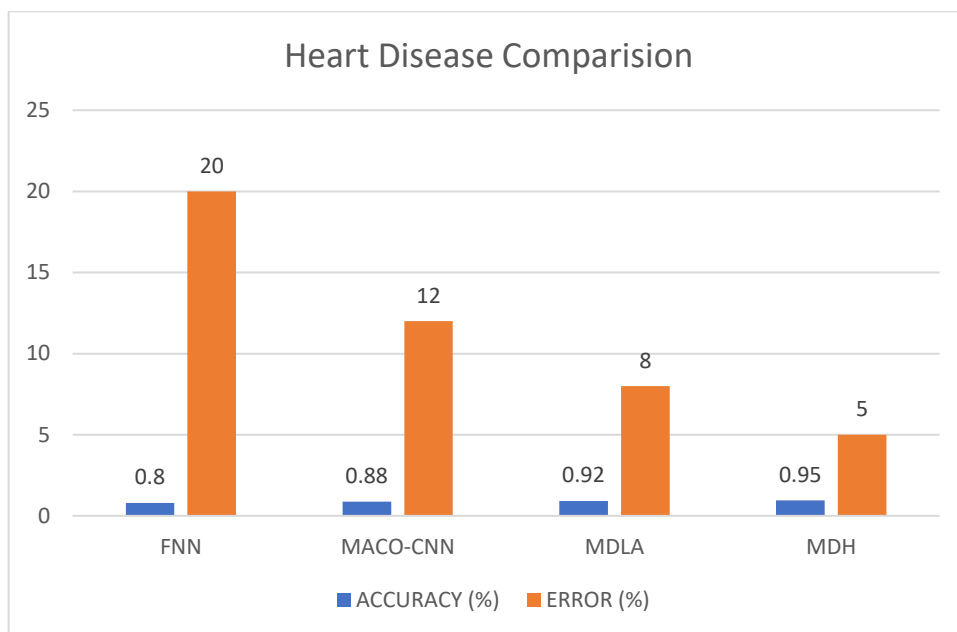


Figure 4 Comparisons of Heart Disease

Conclusion:

Heart disease is the leading cause of death in the world today, as well as a major cause of economic hardship and poor. Identifying the impact of heart disease and finding appropriate solutions to it is an essential task. The aim of this study is to try to solve the problems caused by heart disease by using these machine learning algorithms. Early detection and appropriate treatment of heart disease is an important process. Using this algorithm, we can identify the nature of heart disease, provide rapid treatment, and obtain appropriate results. The results obtained using the Mission Lenin algorithm are accurate and fast, allowing appropriate treatment to be provided, thus delaying death. The conclusion of this article is that when any action is received quickly and accurately, its performance will fulfil its purpose.

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