PREDICTION OF BRAIN STROKE USING MACHINE LEARNING & ARTIFICIAL INTELLIGENCE

[1]K. Keerthana, [2]V. Kemnisha, [3]Ms. Selvameena, [4]Dr. Kiruba Devi,

[5]Dr. Kumanan

[1]UG Student, [2]UG Student, [3]Professor, [4]Professor, [5]Professor

[1]Department of Computer Science and Engineering

[1]Dr. M.G.R. Educational and Research Institute, Maduravoyal, Chennai, India

Abstract - A stroke, also known as a cerebrovascular accident or CVA is when part of the brain loses its blood supply and the part of the body that the blood-deprived brain cells control stops working. This loss of blood supply can be ischemic because of lack of blood flow, or haemorrhagic because of bleeding into brain tissue. As a result, in a matter of minutes, brain cells begin to die. A stroke is a medical emergency because strokes can lead to death or permanent disability. This condition is classified as a serious illness and can endanger lives.

Index Terms - CVA - cerebrovascular accident, Ischemic - lack of blood supply to a part of the body,

II. INTRODUCTION

Stroke is the second leading cause of death worldwide and one of the most life- threatening diseases for persons above 65 years. It injures the brain like a “heart attack” which injures the heart. Once a stroke disease occurs, it not only costs huge medical care and permanent disability but can eventually lead to death. Every 4 minutes someone dies of stroke, but up to 80% of stroke can be prevented if we can identify or predict the occurrence of stroke in its early stage. Stroke is a blood clot or bleed in the brain which can cause permanent damage that has an effect on mobility, cognition, sight or communication.

Stroke is considered a medical urgent situation and can cause long-term neurological damage, complications and often death. The majority of strokes are classified as ischemic, embolic and Hemorrhagic. An ischemic embolic stroke happens when a blood clot forms away from the patient brain usually in the patient heart and travels through the patient bloodstream to lodge in narrower brain arteries. Hemorrhagic stroke is considered another type of brain stroke as it happens when an artery in the brain leaks blood or ruptures. Strokes are sudden but many of the disease processes that precede them take a long time to develop. This is why age is the the most clear-cut risk factor for stroke: the chance of blockage or breakage rises with every passing year, so – although it can strike at any age – stroke is much more likely the older we get. The

Stroke risk factors included in the profile are age, systolic blood pressure, BMI, cholesterol, diabetes, smoking status and intensity, physical activity, alcohol drinking, past history (hypertension, coronary heart disease) and family history (stroke, coronary heart disease).

On the basis of the risk factors in the profile, which can be readily determined on routine physical examination in a physician's office, stroke risk can be estimated. An individual's risk can be related to the average risk of stroke for persons of the same age and sex. Stroke occurs when the blood flow to various areas of the brain is disrupted or diminished, resulting in the cells in those areas of the brain not receiving the nutrients and oxygen they require and dying.

A stroke is a medical emergency that requires urgent medical attention. Early detection and appropriate management are required to prevent further damage to the affected area of the brain and other complications in other parts of the body. The World Health Organization (WHO) estimates that fifteen million people worldwide suffer from strokes each year, with one person dying every four to five minutes in the affected population. Stroke is the sixth leading cause of mortality in the United States according to the Centers for Disease Control and Prevention (CDC) . Stroke is a noncommunicable disease that kills approximately 11%

of the population. In the United States, approximately 795,000 people suffer from the disabling effects of strokes on a regular basis .

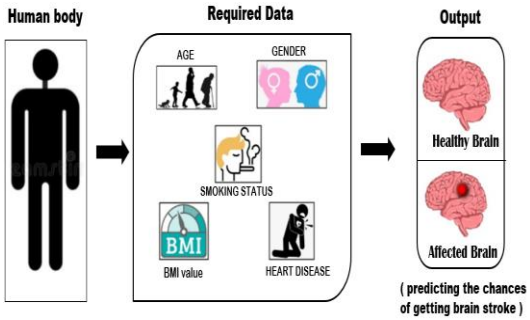

Fig-2.1: Predicting the stroke

It is India's fourth leading cause of death. Strokes are classified as ischemic or hemorrhagic. In a chemical stroke, clots obstruct the drainage; in a hemorrhagic stroke, a weak blood vessel bursts and bleeds into the brain. Stroke may be avoided by leading a healthy and balanced lifestyle that includes abstaining from unhealthy behaviors, such as smoking and drinking, keeping a healthy body mass index (BMI) and an average glucose level, and maintaining an excellent heart and kidney function. Stroke prediction is essential and must be treated promptly to avoid irreversible damage or death.

With the development of technology in the medical sector, it is now possible to anticipate the onset of a stroke by utilizing ML techniques. The algorithms included in ML are beneficial as they allow for accurate prediction and proper analysis. The majority of previous stroke-related research has focused on, among other things, the prediction of heart attacks. Brain stroke has been the subject of very few studies. The main motivation of this paper is to demonstrate how ML may be used to forecast the onset of a brain stroke. The most important aspect of the methods employed and the findings achieved is that among the four distinct classification algorithms tested, Random Forest fared the best, achieving a higher accuracy metric in comparison to the others. One downside of the model is that it is trained on textual data rather than real time brain images. The implementation of four ML classification methods is shown in this paper.

III. LITERATURE REVIEW

- eethanjali et al, In their paper, stroke attack can be predicted accurately. They have used three classifiers such as logistics regression, Decision tree classifier and support vector classifier for the prediction of stroke. The classification model is based on 5110 records. And they have provided the result with 95.49% of accuracy.

- eena potdar et al, In their paper they have described different methods of prediction of stroke and concluded that each technique for prediction of stroke has its own advantages and disadvantages. One must perform statistical analysis and initialization to decide on the specific technique to use. However, they suggested random forest technique is considered as one of the most precise techniques for analyzing which shows promising results,

- hraddhaMainali et al,In their paper they have described the stroke diagnosis and outcome prediction using supervised and unsupervised machine learning types.

- nkitha et al, In their paper they have used machine learning or AI intelligence algorithms to predict the type of stroke a patient is suffering through an application where admin, user and interaction with a particular doctor come into play. And finally gives the result for the user which type of stroke he is suffering.

- ida Abedi et al,In their paper they have used artificial intelligence for improving stroke diagnosis in the emergency department. They have mentioned the key step for stroke ML-enabled decision support systems for EDs.

- arshitha et al, In this paper, they have constructed a model for predicting stroke using machine learning algorithms and given the accuracy for each model.

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IV. PROPOSED SYSTEM

This project is an attempt to predict Stroke Disorder using AI and ML. It will be a custom neural network that we will be coming up with to accommodate our data source.

Algorithms Involved Few methodologies used in our projects are:

1. Decision Tree: A decision tree is a decision support tool that uses a treelike graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. It is one way to display an algorithm that only contains conditional control statements. Decision trees are one of the important methods for handling high dimensional data. Tree based learning algorithms are considered to be one of the best and mostly used supervised learning methods. Tree based methods empower predictive models with high accuracy, stability and ease of interpretation. Unlike the linear models, they map nonlinear relationships quite well. They are adaptable at solving any kind of problem at hand. Fig No. 2.3.1 represents part of the decision tree model for prediction of stroke diseases.

2. Naïve Bayes: A Naïve Bayes classifier is a probabilistic machine-learning model that's used for classification tasks. The crux of the classifier is based on the Bayes theorem. Using Bayes theorem, we can find the probability of A happening, given that B has occurred. Hence, B is the evidence and A is the hypothesis. The assumption made here is that the predictors/features are independent. That is the presence of one particular feature does not affect the other. Hence it is called naïve.Naive Bayes algorithms are mostly used in sentiment analysis, spam filtering, recommendation systems etc. They are fast and easy to implement but their biggest disadvantage is that the requirement of predictors to be independent. In most of the real-life cases, the predictors are dependent; this hinders the performance of the classifier. Artificial Neural Network- Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data, be it images, sound, text or time series, must be translated.

3. Artificial Neural Network: Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling or clustering raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data, be it images, sound, text or time series, must be translated. Neural networks help us cluster and classify. They help to group unlabeled data according to similarities among the example inputs, and they classify data when they have a labeled dataset to train on.

V. IMPLEMENTATION

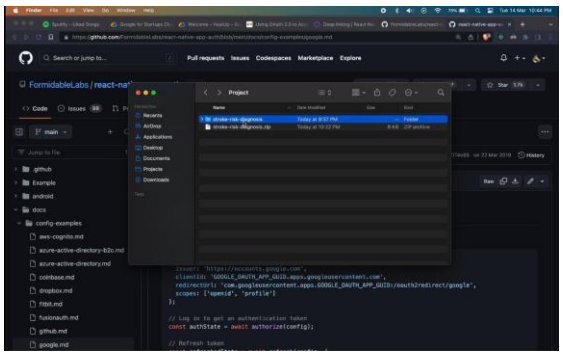

Fig-6.1: stroke risk diagnosis.zip

All these features include the ability to add users, update (edit), and retrieve through search results. It also contains a report generation system that can be saved in a pdf file format.

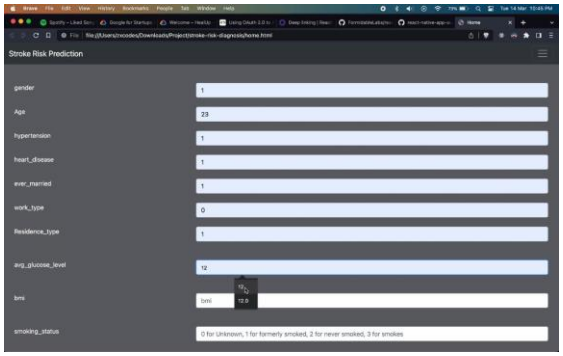

Fig-6.2: mentioning the values

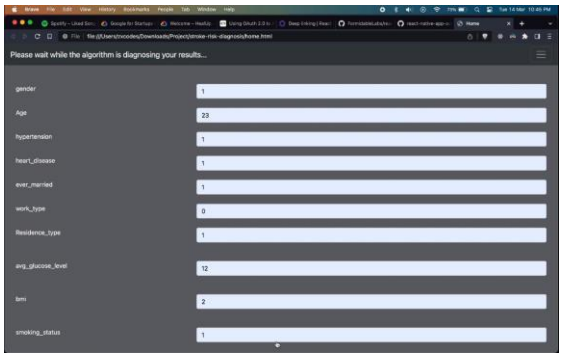

Fig-6.3: algorithm is diagnosing the result

The system works in the following manner, accessing the system various companies and organizations may have different employee structures and hierarchy. Being generic, the developed System has four main access levels which are:

Employee Head of Department (HOD)

Human Resource Manager (HR)

Administrator

All users are presented with the same login interface. Users must login the system by means of a valid username/password combination. After access is granted to the system, the admin can add a new user to the system by entering the basic information which are the full names and email address. The admin also assigns the new user a role which will determine the access level. During the process of user registration, all users are issued with a unique username and password combination. Seeing that the system holds private employee information, the admin has the ability to monitor all activity logs into the system by date and time. The newly added user logs into the system with a default password which can later be changed to a more secure password.

All employees can edit basic information such as newly acquired technical skills and emergency contacts. Employees can apply for leave by filling in a form as well as submitting an attachment to support their leave request. The HOD has the ability to view all employees under his/her department, assign a task and training. The HOD can also create a project, add members to the project and create a work breakdown structure. Being an employee, the HOD can apply for leave as well as check leave days accrued.

VI. RESULT

Stroke prediction is essential and must be treated promptly to avoid irreversible damage or death. With the development of technology in the medical sector, it is now possible to anticipate the onset of a stroke by utilizing ML techniques. Importantly, we showed that it's possible to predict the likely severity of outcomes if the brain scan shows pre-existing, chronic signs of brain 'frailty' (e.g. more than expected from ageing or previous strokes), in addition to early signs of acute ischaemic stroke. Disease Prediction using Machine Learning is the system that is used to predict the diseases from the symptoms which are given by the patients or any user.

The system processes the symptoms provided by the user as input and gives the output as the probability of the disease. We found that accurate and sensitive machine learning models can be created to predict stroke from lab test data.

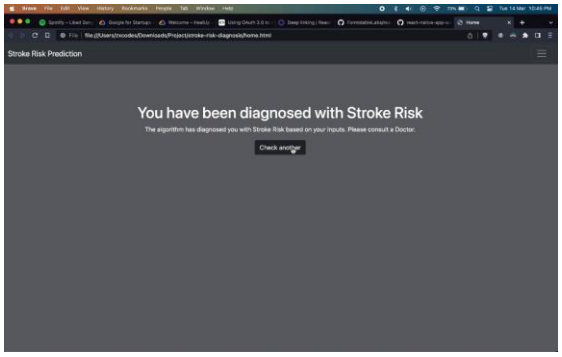

Fig-7.1: result generated - positive

Our results show that the data resampling approach performed the best compared to the other two data selection techniques.

VII. REFERENCES

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