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BRAIN STROKE PREDICTION USING MACHINE LEARNING ALGORITHMS

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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. A stroke is a medical emergency because strokes can lead to death or permanent disability. There are opportunities to treat ischemic strokes but that treatment needs to be started in the first few hours after the signs of a stroke begin. The patient, family, or bystanders should activate emergency medical services immediately should a stroke be suspected. A transient ischemic attack (TIA or mini-stroke) describes an ischemic stroke that is short-lived where the symptoms resolve spontaneously. This situation also requires emergency assessment to try to minimize the risk of a future stroke. By definition, a stroke would be classified as a TIA if all symptoms resolved within 24 hours. According to the World Health Organization (WHO) stroke is the 2nd leading cause of death globally, responsible to approximately 11% of total deaths . For survival prediction, our ML model uses dataset to predict whether a patient is likely to get stroke based on the input parameters like gender, age, various diseases, and smoking status. Unlike most of the datasets, our dataset focuses on attributes that would have a major risk factors of a Brain Stroke.

1. INTRODUCTION

Machine Learning (ML) delivers an accurate and quick prediction outcome and it has become a powerful tool in health settings, offering personalized clinical care for stroke patients. An application of ML and Deep Learning in health care is growing however, some research areas do not catch enough attention for scientific investigation though there is real need of research. Therefore, the aim of this work is to use ML algorithms like Logistic regression, SVM, KNN, Decision Tress and Random Forest to determine and predict the risk of Brain Strokes. A total of 39 studies were identified from the results of Science Direct web scientific database on ML for brain stroke from the year 2007 to 2019[2]. Support Vector Machine (SVM) is obtained as optimal models in 10 studies for stroke problems. Besides, maximum studies are found in stroke diagnosis although number for stroke treatment is least thus, it identifies a research gap for further investigation. Similarly, CT images are a frequently used dataset in stroke. Finally, SVM and Random Forests are efficient techniques used under each category [2]. The present study showcases the contribution of various ML approaches applied to brain stroke.

2. LITERATURE SURVEY

In the research conducted by Manisha Sirsat, Eduardo Ferme, Joana Camara, the main aim of the research was to classify state-of-arts on ML techniques for brain stroke into 4 categories based on their functionalities or similarity, and then review studies of each category systematically. The study further discusses the outcomes and accuracies obtained by using different Machine Learning models using text and image-based datasets.

In this study, the authors discussed many stroke related problems from the state-of-art. The reviewed studies were grouped in several categories based on their similarities. The study notes that it is difficult to compare studies as they employed different performance metrics for different tasks, considering different datasets, techniques, and tuning parameters. Hence, it only mentions the research areas which were targeted in more than one study and the studies which report highest classification accuracy in each section

Harish Kamal, Victor Lopez, Sunil A. Sheth, in their study discus how Machine Learning (ML) through pattern recognition algorithms is currently becoming an essential aid for the diagnosis, treatment, and prediction of complications and patient outcomes in several neurological diseases. The evaluation and treatment of Acute Ischemic Stroke (AIS) have experienced a significant advancement over the past few years, increasingly requiring the use of neuroimaging for decisionmaking. This study offers an insight into the recent developments and applications of ML in neuroimaging focusing on acute ischemic stroke. The implementations of machine learning are numerous, from early identification of imaging diagnostic findings, estimating time of onset, lesion segmentation, and fate of salvageable tissue, to the analysis of cerebral edema, and predicting complications and patient outcomes after treatment.

The paper finally concludes by discussing how Machine learning applications are expanding in the medical field for diagnostic and therapeutic purposes, and the rapidly expanding and increasingly neuro-imaging reliant field of AIS is proving to be fertile ground. There is a particular need for ML solutions in this field, which is faced with the challenge of increasingly complex data, with limited human expert resources. Future directions in ML for AIS may require collaborative approaches across multiple institutions to build a robust dataset for efficient training of ML networks [2].

In the research conducted by Chuloh Kim, Vivienne Zhu, Jihad Obeid and Leslie Lenert, they have assessed performance of natural language processing (NLP) and machine learning (ML) algorithms for classification of brain MRI radiology reports into acute ischemic stroke (AIS) and non-AIS phenotypes. The method followed included All brain MRI reports from a single academic institution over a two-year period were randomly divided into 2 groups for ML: training (70%) and testing (30%). Using “quanteda” NLP package, all text data were parsed into tokens to create the data frequency matrix. Ten-fold crossvalidation was applied for bias correction of the training set. Labelling for AIS was performed manually, identifying clinical notes. They applied binary logistic regression, naïve Bayesian classification, single decision tree, and support vector machine for the binary classifiers, and we assessed performance of the algorithms by F1-measure. They also assessed how n-grams or term frequency-inverse document frequency weighting affected the performance of the algorithms.

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- Detection is not possible at an earlier stage
- Parctical use of various collected data is time consuming

PROPOSED SYSTEM:

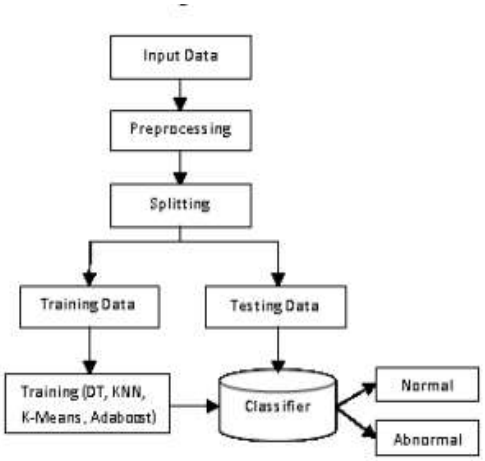
The proposed system acts as a prediction support machine and will prove as an aid for the user with diagnosis. The algorithms used to predict the output have potential in obtaining a much better accuracy then the existing system. In proposed system, the practical use of various collected data has turned out to be less time consuming. .we calculate accuracy of machine learning algorithms for predicting heart disease, for this algorithms are k-nearest neighbor, decision tree, linear regression and support vector machine(SVM) by using UCI repository dataset for training and testing

ADAVANTAGES:

- High performance and accurancy rate
- Machine Learning Algorithms is very flexible and is widely in various domains with high rates of success
- Data and information collected for prediction is easily available to the users. System provides users with precaution that can be taken to reduce risk factor.

3. SYSTEM ANALYSIS

SYSTEM ARCHITECTURE:



EXISTING SYSTEM:

Very few systems use the available clinical data for prediction purposes and even if they do ,they are restricted by the large number of association rules that apply.Diagnosis of the condition soley depends upon the Doctor's intuition and patient's records.The decision support system and will prove to be an aid for the physicians with the diagnosis.The algorithm,Fuzzy c means uses clustering and makes use of clusters and data points to predict the relativity of an attribute .Each data point is associated with multiple clusters depending upon the membership degrees

DISADAVANTAGES:

4. Modules

Users:

User add the data to the database and view the data to the view data and predict the Brain stroke disease using ml.

Data Collection:

First step for predication system is data collection and deciding about the training and testing dataset. In this project we have used 73% training dataset and 37% dataset used as testing dataset the system.

Attribute Selection:

Attribute of dataset are property of dataset which are used for system and for Brain stroke many attributes are like heart bit rate of person, gender of the person, age of the person and many more predication system.

Preprocessing of data:

Preprocessing needed for achieving prestigious result from the machine learning algorithms. For example Random forest algorithm does not support null values dataset and for this we have to manage null values from original raw data. For our project we have to convert some categorized value by dummy value means in the form of "0"and "1" by using following code

Admin:

Admin will give authority to Users. In order to activate the users. the admin can Prediction Brain stroke Disease.

5. CONCLUSION:

After the literature survey, we came to know various pros and cons of different research papers and thus, proposed a system that helps to predict brain strokes in a cost effective and efficient way by taking few inputs from the user side and predicting accurate results with the help of trained Machine Learning algorithms. Thus, the Brain Stroke Prediction system has been implemented using the given 5 Machine Learning algorithm given a highest accuracy of 98.56%. The system is therefore designed providing simple yet efficient User Interface design with an empathetic approach towards their users and patients. The system has a potential for future scope which could lead to better results a better user experience. This will help the user to save their valuable time and will help them to take appropriate measures based on the results provided.

Future enhancement

The future scope for the implemented system can be:
1. Increasing the accuracy of the model.
2. Additional information about brain stroke can be explained.
3. Allowing users to visualize their results based on their inputs.

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