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Brain Stroke Detection Using Machine Learning

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***Abstract*: This gives a general algorithm to classify the stroke using different machine learning algorithms with the help of stroke data set. Machine Learning algorithms can be used in different sectors such as surveillance, health, Auto mobiles etc. In the proposed idea we have to collect the data from the different cases from the patients and arrange this data in data set. By using the dataset, we have to train the machine by busing different machine learning algorithms such as, support vector machine, XG Boost, SGD, Decision tree and random forests. In these algorithms, Random Forest achieves high accuracy.**

***Keywords*: Case sheets, Support Vector Machine, XG Boost, SGD, Decision Tree, Random Forest.**

1. Introduction

A brain contains the lakhs of neurons and also brain is the important control system in the body. Just like a memory to the computer, the brain stores all the information. So that brain plays a key role in storing the information and controlling the body. Brain controls each and every movement in the body. Any activity in the body can be done in the body under the control of the brain only. As per the records, the number people lost their life in developing countries is more due to brain stroke. The death rate is five times greater in the developing countries as compared with the other countries in the world. This death also increased more rapidly by the end of this decade. Mainly the stroke is described into three types: hemorrhagic stroke, ischemic stroke and transient ischemic attack. Generally Ischemic stroke is the most common type of stroke. As from the resources most of the people died due to ischemic stroke. The ischemic stroke mainly occurs due to clotting of blood in the brain. It has mainly two types: thrombotic stroke and embolic stroke. Embolic stroke mainly occurs due to clot forms in different parts in the body and transfer toward the brain and restricts the flow of blood. Thrombotic stroke is due to a clot that weakens blood flow in an artery, which carries blood to the brain.

2. Literature Survey

1) G. A. P. Singh and P. K. Gupta, Performance analysis of various machine learning-based approaches for detection and classification of Stroke.
2) Detect and prediction of the stroke using different Machine Learning algorithms (Tahia Tazim, Md Nur Alam).

3. Modules

A. System Module

1) Train data set
System can give training to the data set.

2) Pre-processing
Pre-processing will be done using PCA module.

3) Model performance
In this step the machine mainly concentrates on the accuracy, precision and recall. Without having the highest rate of accuracy, the development of system is useless. So, it is better to have high accuracy system. Accuracy can be calculated by the taking the number of correct predictions from the total number of predictions.

4) Predictions
Using the machine learning algorithms, we can predict the result.

B. User module

1) Upload dataset
The user uploads the dataset.

2) View dataset
The uploaded dataset is viewed by the user.

3) Viewing graphs
Graphs can be generated by the system and the user can be view that graphs.

4. Algorithms

In this system we mainly use the following algorithms:

A. Support Vector Classifiers Algorithm

Support Vector Machine is one of the Supervised Machine Learning algorithms. Support vector machine can be used for both classification and regression models. Here initially we want to load the library and the Stroke dataset. After loading the dataset and library we have to conclude the features of the dataset. After concluding the dataset, we have to split or divide the dataset for testing and training the machine in different ratios. Finally, we have to predict the results using this support vector machine Algorithm.

The same above procedure should be carried out for the following three algorithms also. But we to specify the specifications of these algorithms.

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B. Logistic Regression

Logistic Regression is mainly used to get the result in the Boolean format. Here we have the output in yes/no type or 0/1 type.

C. Random Forest Classifier

Random forest mainly contains the collection of the decision trees. By comparing and taking the average of all the decision trees, this gives the most effective and the accurate results.

D. XG-Boost

XGBoost is mainly used to improve the performance of the system. It gives the most accurate results in less amount of time. It performs all the operation in looping format. Instead of taking entire dataset at a time... it takes some part of the dataset in each iteration. Generally, the XG-Boost can be used to boost up the sequential processes.

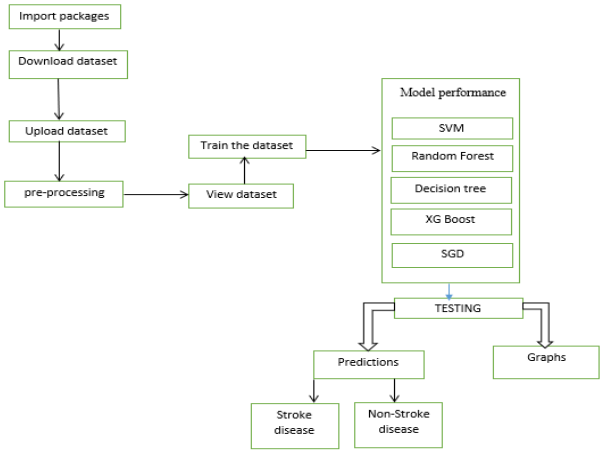

Fig. 1. System architecture

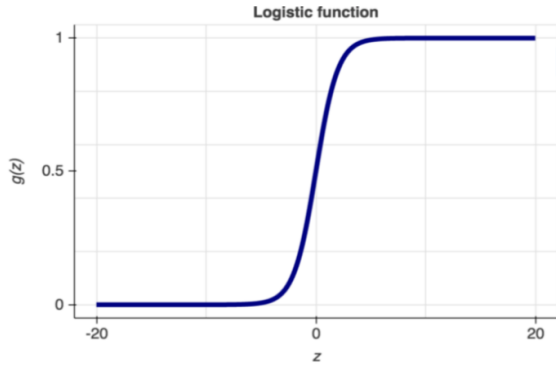

Fig. 2. Logistic function

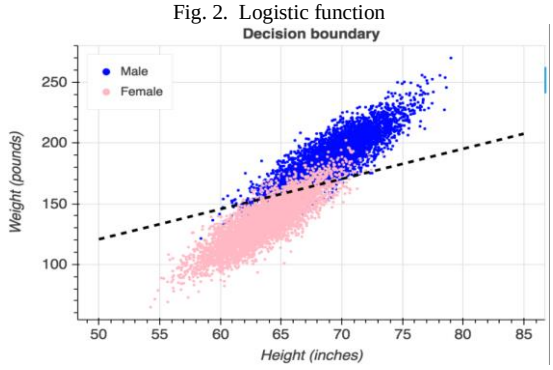

Fig. 3. Decision boundary

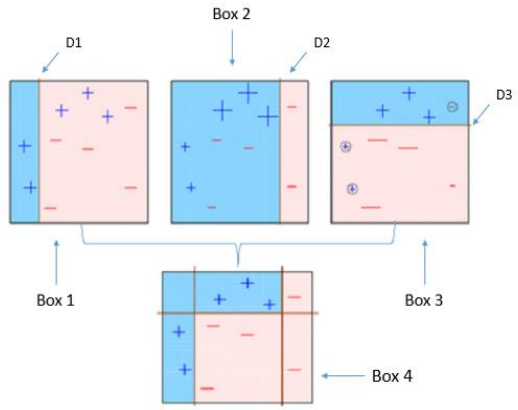

Fig. 4. Classic classification

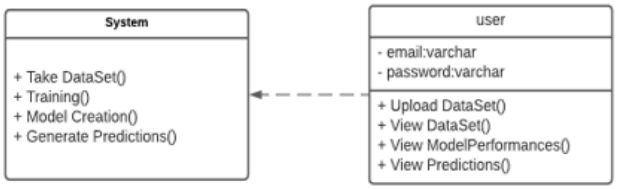

Fig. 5. Class diagram

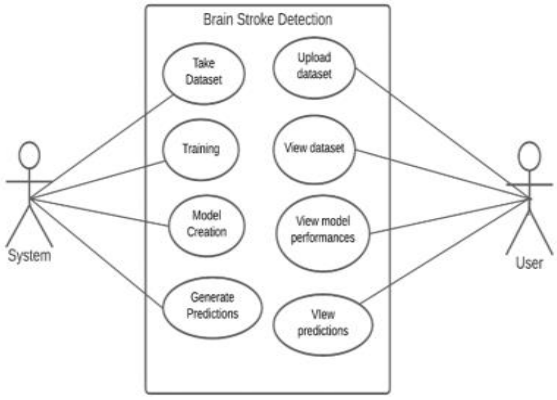

Fig. 6. Use Case diagram

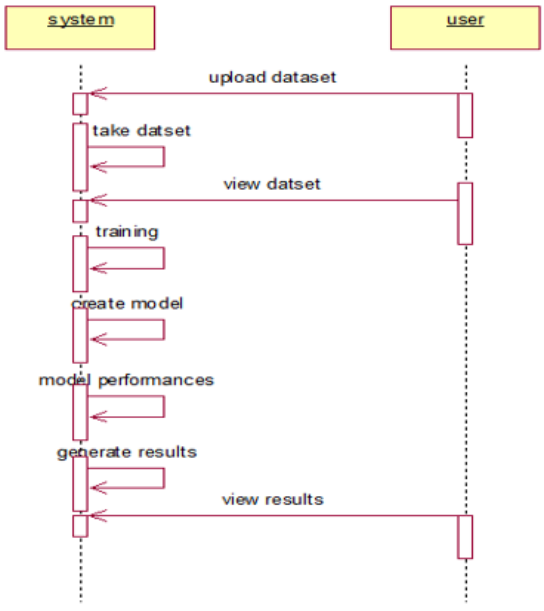

Fig. 7. Sequence diagram

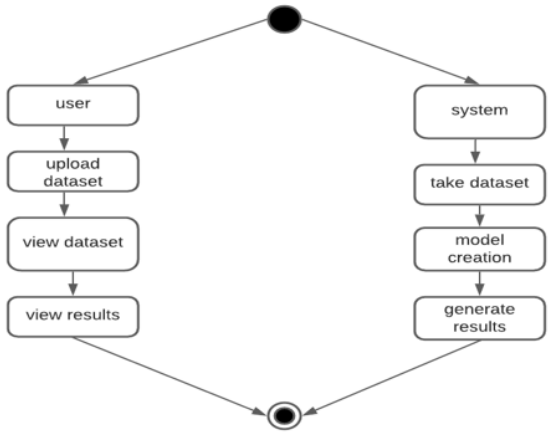

Fig. 8. Activity diagram

Fig. 9. Deployment diagram

5. Conclusion

The main conclusion of this paper is, it decreases the death rate of population due to cause of the Brain stroke. By using this system, we can predict the brain stroke earlier and take the require measures in order to decrease the effect of the stroke. So that it saves the lives of the patients without going to death.

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