

Efficient Prediction of Brain Stroke Using Machine Learning

Abishek Thillai.S¹ and Dr. H. Jayamangala²

PG Student, Department of Computer Applications¹

Assistant Professor, Department of Computer Applications²

Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai, Tamil Nadu, India

22304258@vistas.ac.in and jayamangala.scs@velsuniv.ac.in

Abstract: In recent years strokes are one of the leading causes of death by affecting the central nervous system. Among different types of strokes, ischemic and hemorrhagic majorly damages the central nervous system. According to the World Health Organization (WHO), globally 3% of the population are affected by subarachnoid hemorrhage, 10% with intracerebral hemorrhage, and the majority of 87% with ischemic stroke. In this research work, Machine Learning techniques are applied in identifying, classifying, and predicting the stroke from medical information. The existing research is limited in predicting risk factors pertained to various types of strokes. To address this limitation a Stroke Prediction (SPN) algorithm is proposed by using the improvised RNN in analyzing the levels of risks obtained within the strokes. This research of the Stroke Predictor (SPR) model using machine learning techniques improved the prediction accuracy is higher when compared with the existing models. In our work we will be using the following algorithms such as Convolution Neural Network (CNN) as existing and Recurrent Neural Network (RNN) as proposed and its accuracy is been calculated and well compared. From the results obtained it is proved that proposed Recurrent Neural Network (RNN) works better than existing Convolution Neural Network (CNN)..

Keywords: WHO (World Health Organization), SPN (Stroke Prediction), RNN, SPR (stroke Predictor), CNN (Convolution Neural Network)

I. INTRODUCTION

In an adult human being even when the body is set to rest 20% of the oxygen and glucose also about 2% of the entire body weight is constituted by the brain. The blood flow in the brain is said to extend when recreation of the neurons takes place in certain parts of the brain. It is carried out through the internal carotid and vertebral arteries. The blood is then altered from head to heart through the internal jugular veins. The loss of the blood might be observed in two scenarios in which the flow of blood among the blood tissues decreases results in the ischemic stroke whereas if internal bleeding occurs among the brain tissues known as hemorrhagic stroke and the types of strokes are demonstrated. The flow of the blood from arteries among the brain tissues leads to blockage or becomes slender. This blocking might also happen when the tiny parts of plaque that are caused through atherosclerosis damage thereby creating a clot in the blood vessel. Hemorrhagic stroke referred to as a severe stroke in which the blocked artery might damage resulting in the bleeding or explosion of the artery. When the blood is divulged and leaked it spreads out causing pressure on the brain.

II. LITERATURE SURVEY

1. Brain stroke detection system using brain CT image processing. Publisher: IEEE 2023

PMoffy Vas; Amita Dessai

Stroke is the root cause for a large number of deaths worldwide, out of which brain stroke is the cause of the highest mortality rates. Computer tomography scan is employed by radiologists to detect stroke in the body and track its growth. Visual interpretation of database can lead to stroke detection at later stages, thus leading to late treatment of

stroke which only boosts up the stroke death rates. Therefore, image processing tools can be used for early detection of stroke. In this paper, a brain stroke detection algorithm is proposed using mathematical morphological operations for segmentation of the brain region of interest, from which Haralick features are extracted and used for classification of stroke by artificial neural networks.

2. Multi-Stage Brain Stroke Detection and Prediction Using Multi-class SVM Classifier Publisher: IEEE 2023
Janee Alam; Sabrina Alam; Alamgir Hossan

Recognition and prediction of brain stroke in the earliest reference point stage can be very useful to improve the survival rate of patients. But diagnosis of stroke is one the major challenging task for radiologist. For detecting, predicting and diagnosing brain stroke, an intelligent computer-aided diagnosis system can be very much useful for radiologist. This paper proposed an efficient brain stroke detection and prediction algorithm using multi-class SVM (Support Vector Machine) classifier. Multi-stage classification was used for the detection of stroke. This system can also predict the probability of brain stroke. In every stage of classification image enhancement and segmentation have been done separately. Image scaling, color space transformation and contrast enhancement have been used for image enhancement. Threshold and marker-controlled watershed based segmentation has been used for segmentation. For classification purpose, SVM binary classifier was used. Our proposed technique shows higher degree of accuracy in brain stroke detection and prediction.

3. Automatic detection of abnormalities in brain radiographs caused by Plano cellular brain stroke.
Publisher: IEEE 2023

Vesna Zeljkovic; Milena Bojic

We propose in this paper automatic algorithm for early Plano cellular brain stroke detection in brain X ray images. Considering the fact that brain stroke is one of the most lethal strokes and that it is usually diagnosed too late, the solution is to attempt early diagnosis at general practitioners level, using cheapest diagnostic tools, chest radiography. The proposed algorithm determines and segments the suspected area in brain X ray images. It consists of two steps: comparison between extracted Plano cellular brain stroke structure and the analyzed brain X ray image by calculating similarity coefficients and finding the maximum similarity coefficient which will indicate the suspected stroke affected area in the brain image. The obtained results are promising and confirm that the proposed algorithm should serve as the foundation for future research in this area.

III. METHODOLOGY SECTION

Implementation is the process that actually yields the lowest-level system elements in the system hierarchy (system breakdown structure). The system elements are made, bought, or reused. Production involves the hardware fabrication processes of forming, removing, joining, and finishing; or the software realization processes of coding and testing; or the operational procedures development processes for operators' roles. If implementation involves a production process, a manufacturing system which uses the established technical and management processes may be required.

The purpose of the implementation process is to design and create (or fabricate) a system element conforming to that element's design properties and/or requirements. The element is constructed employing appropriate technologies and industry practices. This process bridges the system definition processes and the integration process.

System Implementation is the stage in the project where the theoretical design is turned into a working system. The most critical stage is achieving a successful system and in giving confidence on the new system for the user that it will work efficiently and effectively. The existing system was long time process.

The proposed system was developed using matlab. The existing system caused long time transmission process but the system developed now has a very good user-friendly tool, which has a menu-based interface, graphical interface for the end user. After coding and testing, the project is to be installed on the necessary system. The executable file is to

be created and loaded in the system. Again the code is tested in the installed system. Installing the developed code in system in the form of executable file is implementation.

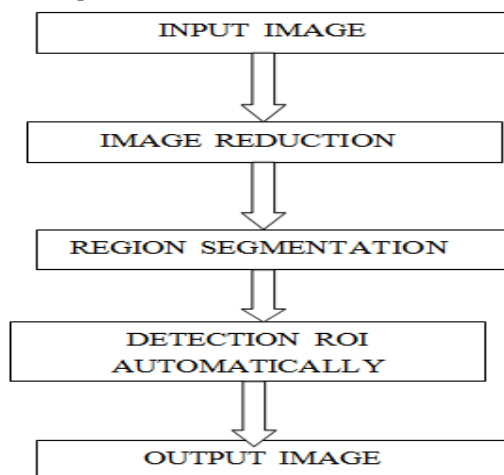


Fig.1: System Flow

IV. CONCLUSION

This project demonstrates the modeling of brain stroke as classification task and describes the implementation of ML approach for classifying brain stroke as either benign or malignant. The results of ML were compared on the basis of accuracy with existing system. It was observed that classification implemented by ML technique in this project is more efficient compare to existing algorithms as seen in the accuracy and precision. Based on the results, ML technique is more efficient compared to other existing methods technique in brain stroke detection.

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