JP INFOTECH

# OUR PROPOSED PROJECT TITLE:

# Brain Stroke Detection System based on CT images using Deep Learning

# IEEE BASE PAPER TITLE:

# Innovations in Stroke Identification: A Machine Learning-Based Diagnostic Model Using Neuroimages

## IEEE BASE PAPER ABSTRACT:

Cerebrovascular diseases such as stroke are among the most common causes of death and disability worldwide and are preventable and treatable. Early detection of strokes and their rapid intervention play an important role in reducing the burden of disease and improving clinical outcomes. In recent years, machine learning methods have attracted a lot of attention as they can be used to detect strokes. The aim of this study is to identify reliable methods, algorithms, and features that help medical professionals make informed decisions about stroke treatment and prevention. To achieve this goal, we have developed an early stroke detection system based on CT images of the brain coupled with a genetic algorithm and a bidirectional long short-term Memory (BiLSTM) to detect strokes at a very early stage. For image classification, a genetic approach based on neural networks is used to select the most relevant features for classification. The BiLSTM model is then fed with these features. Cross-validation was used to evaluate the accuracy of the diagnostic system, precision, recall, F1 score, ROC (Receiver Operating Characteristic Curve), and AUC (Area Under The Curve). All of these metrics

were used to determine the system's overall effectiveness. The proposed diagnostic system achieved an accuracy of 96.5%.We also compared the performance of the proposed model with Logistic Regression, Decision Trees, Random Forests, Naive Bayes, and Support Vector Machines. With the proposed diagnosis system, physicians can make an informed decision about stroke.

## OUR PROPOSED PROJECT ABSTRACT:

Brain stroke detection is a critical medical process requiring prompt and accurate diagnosis to facilitate effective treatment. This project, "Brain Stroke Detection System based on CT Images using Deep Learning," leverages advanced computational techniques to enhance the accuracy and efficiency of stroke diagnosis from CT images.

The system is developed using Python for the backend, with Flask serving as the web framework. The user interface is crafted with HTML, CSS, and JavaScript, ensuring an intuitive and responsive experience for medical professionals. Two distinct deep learning models are employed to analyze the CT images: a Convolutional Neural Network (CNN) and a Long Short-Term Memory (LSTM) network.

The CNN model architecture, chosen for its powerful image processing capabilities, achieves a remarkable training accuracy of 99.00% and a validation accuracy of 98.00%. This high level of accuracy underscores the model's robustness in detecting stroke indicators from CT images. Complementing this, the LSTM architecture, known for its effectiveness in handling sequential data, achieves a training accuracy of 99.00% and a validation accuracy of 95.00%.

Although slightly lower than the CNN, the LSTM model contributes additional insights, enhancing the overall detection system's reliability.

The dataset utilized in this project comprises 2,501 CT images, with 1,551 images of normal brains and 950 images showing stroke conditions. This balanced and diverse dataset ensures that the models are trained on a wide variety of cases, promoting generalizability and reducing the risk of overfitting.

The integration of these technologies results in a sophisticated brain stroke detection system that not only boasts high accuracy but also promises scalability and practical utility in clinical settings. This project demonstrates the potential of deep learning in medical diagnostics, offering a tool that can significantly aid healthcare professionals in the timely and precise identification of brain strokes.

## SYSTEM REQUIREMENTS:

## HARDWARE REQUIREMENTS:

- System : Pentium i3 Processor.
- Hard Disk : 500 GB.
- Monitor : 15'' LED.
- Input Devices : Keyboard, Mouse.
- Ram : 8 GB.

## SOFTWARE REQUIREMENTS:

- Operating System : Windows 10 / 11.
- Coding Language : Python 3.10.9.

- Web Framework : Flask.
- Frontend : HTML, CSS, JavaScript.

## REFERENCE:

M. A. Saleem et al., "Innovations in Stroke Identification: A Machine Learning-Based Diagnostic Model Using Neuroimages," in IEEE Access, vol. 12, pp. 35754-35764, 2024, doi: 10.1109/ACCESS.2024.3369673, IEEE 2024.