Early Detection of Neurological Disorder Using Encrypted EEG Data

Project-III (IT207PPC21) report submitted to

Guru Ghasidas Vishwavidyalaya

in partial fulfilment for the award of the degree of

Bachelor of Technology

in

Information Technology

by

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Under the supervision of

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March, 2025

March 03, 2025

DEPARTMENT OF INFORMATION TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA

BILASPUR - 495009, INDIA

CERTIFICATE

This is to certify that the project report entitled "**Early Detection of Neurological Disorder Using Encrypted EEG Data**" submitted by **Shivani Jadon, Isha Kumari, Ankur Verma** (Roll No. 21036150, 21036126, 21036166) to Guru Ghasidas Vishwavidyalaya towards partial fulfilment of requirements for the award of degree of Bachelor of Technology in Information Technology is a record of bonafide work carried out by him under my supervision and guidance during March, 2024.

HOD Signature:

Date: March 03, 2025
Place: Bilaspur

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Abstract

Name of the student: **Shivani Jadon, Isha Kumari, Ankur Verma**

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Degree for which submitted: **Bachelor of Technology**

Department: **Department of Information Technology**

Thesis title: **Early Detection of Neurological Disorder Using Encrypted EEG Data**

Thesis supervisor: **Dr. Ankit Kumar**

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Neurological disorders, including epilepsy, Alzheimer's, Parkinson's disease, and other cognitive impairments, pose significant health challenges worldwide. Early detection is crucial for effective intervention, treatment planning, and improved patient outcomes. This project focuses on leveraging Electroencephalography (EEG) data, a widely used non-invasive technique for recording electrical brain activity, to develop a secure and efficient diagnostic system. The proposed system integrates deep learning models with encrypted EEG data to ensure both high classification accuracy and patient data security. The methodology involves several key steps, including data collection from publicly available datasets and clinical sources, preprocessing techniques such as noise filtering and signal normalization, and the implementation of deep learning models like Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks. These models are trained to classify different neurological disorders based on EEG signal patterns. Encryption

techniques are applied at various stages to protect patient privacy while allowing AI models to process the data effectively. Despite its promising results, the project encounters challenges such as, the requirement for high-quality labeled EEG datasets, and the trade-off between model complexity and real-time performance. Future research directions include optimizing encryption efficiency, expanding the dataset for broader applicability, and developing a cloud-based platform for real-time neurological disorder diagnosis. By integrating state-of-the-art AI models with strong encryption mechanisms, this project presents a novel approach to the early detection of neurological disorders. It offers a secure, reliable, and scalable solution, paving the way for AI-driven healthcare innovations that prioritize both diagnostic accuracy and patient data protection.