Abstract: -

The early and accurate detection of learning disabilities in children is crucial for effective intervention and support. This study presents a machine learning-based approach utilizing EEG data to classify learning disorders. The methodology involves collecting EEG readings from children with learning disabilities, preprocessing the data by handling missing values, normalizing features, and encoding labels. A deep learning model incorporating Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM) networks is developed to capture temporal patterns in EEG signals. The dataset is split into training and testing sets (80%-20%), and the model is trained using the Adam optimizer with cross-entropy loss for 20 epochs. Performance evaluation is conducted using confusion matrices and classification reports. To ensure accessibility, a Gradio-based web interface is deployed, allowing non-experts such as doctors and psychologists to analyze EEG data seamlessly. The proposed system demonstrates the potential of deep learning in enhancing the diagnostic process for learning disabilities such as dyslexia , Autism spectrum disorder(ASD) , Attention deficit hyperactivity disorder (ADHD).

**Keywords:**

Learning Disabilities, EEG Signal Processing, Deep Learning, Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM), Machine Learning, Time-Series Analysis, Neural Networks, Data Preprocessing.