

Autism Spectrum Disorder Classification on Electroencephalogram  
Data using Neural Networks

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## **Abstract**

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by the presence of restricted interests, repetitive behaviours, and deficits in social communication. Diagnosis of Autism is currently a challenging and time-consuming process that involves observation of the behaviour of potential ASD individuals. However, the behavioural symptoms may vary in type and severity from person to person and they may also change with time which makes it even harder to properly diagnose by a behaviour observation. Despite being challenging, early diagnosis of ASD is considered very much important in effectively treating Autistic children and improving their lives.

Electroencephalogram (EEG) patterns of Autistic individuals are found to carry certain abnormalities compared to that of normal individuals. Therefore, EEGs can act as potential biomarkers of ASD prevalence and can be used in creating an effective ASD diagnosis system.

This research was aimed at designing and developing a low-cost, automated and behaviour-independent mechanism to diagnose the prevalence of ASD in children at an early age by using neural network algorithms. EEG data of 17 participants including both Autistic and Normal children aged between 5 to 17 years were considered in this research.

The author created a pre-processing pipeline to remove noise from EEG data before it was used in the classifications. This research attempted six different types of neural networks in classifying ASD prevalence. The best accuracy achieved was 93% and came from the ConvLSTM model. The CapsNet model gave the second-best accuracy of 83%.

**Keywords** – EEG data, Autism Spectrum Disorder, Deep Learning, Neural Networks, ConvLSTM, LSTM, CNN, CapsNet