**LITERATURE REVIEW**

*A Multimodal Approach for Identifying Autism Spectrum Disorders in Children*

* 1 in 54 children has been identified with ASD
* EEG is a relatively easyto-use, low-cost brain measurement tool that has been widely used for monitoring atypical brain development.
* ASD is a complex and heterogeneous disease with abnormal manifestations from
* the cellular level to the behavioral level, and therefore, it is difficult to accurately and effectively identify ASD solely relying on unimodal data, such as EEG or ET
* Due to the data heterogeneity of neurophysiological and behavioral modalities, it is still challenging to explore hidden correlations and complementarity directly from the original data. To address this challenge, multimodal fusion is a great option
* Given a training set data, the learning of SDAE is started by a greedy layer-wise pretraining procedure which learns a stack of DAEs one by one in an unsupervised learning manner. The key concept in greedy layer-wise learning is to train one layer every time. In this way, the network parameters are initialized, reducing the problem of local minima. In the fine-tuning phase, all the learned hidden layers from several DAEs are stacked to form a deep network, the decoder networks of each DAE are removed, and a softmax layer is added in the top of the encoder network, as shown in . Then, the whole network parameters can be jointly optimized and fine-tuned using the back-propagation (BP) algorithm with the labelinformation in a supervised manner. Thus, the learned representations from the unsupervised learning step can be improved with better intra-class compactness and inter-class discriminability
* EEG and ET data have important complementary characteristics. Specifically, EEG-SDAE obtained a higher classification accuracy (82.5%) than ET-SDAE (77.7%) for ASD subjects, whereas for TD subjects, ET significantly outperforms EEG (94.0% versus 80%). This proves that EEG and ET data contain complementary information and have different classification abilities for ASD and TD children.
* 92.5% (10% improvement)

*Transfer Learning and Hybrid Deep Convolutional*

*Neural Networks Models for Autism Spectrum*

*Disorder Classification From EEG Signals*

* Transfer learning
* ML models are extremely simplistic, they are unable to deal with the complexities of the situation, which leads to a low degree of classification accuracy. This issue is caused by the fact
* that these models are overly simplistic.
* deep hybrid multi-modelbased deep learning for automatic ASD diagnosis using seven pre-trained CNNs deep learning models.
* AlexNet , ResNet18 , GoogLeNet , MobileNetV2 , SqueezeNet , ShuffleNet and EfficientNetb0
* AlexNet-made of five convolutional blocks, then regular max-pooling layers and three fully connected networks.