INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
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Technology, Social Impact

Classification of Autism spectrum disorder (ASD) using resting state functional MRI scans (rsfMRI)

ABSTRACT

Autism spectrum disorder, is a developmental disorder characterized by persistent problems in social communication and interaction, along with restricted and repetitive patterns of behavior, interests or activities. The current psychiatric diagnostic process is based purely on the behavioral observation of symptomology (DSM-5/ICD-10) and may be prone to misdiagnosis. For more quantitative diagnosis, we need advanced and scalable machine learning infrastructure that will allow us to identify reliable biomarkers of mental health disorders. Research has revealed that brain connectivity analysis provides crucial insights to pinpoint the differences between autistic and typically developing (TD) children during development. Since functional magnetic resonance imaging (fMRI) can measure brain activity, it provides data for the study of brain dysfunction disorders and has been widely used in ASD identification. In our approach we are exploring different static and dynamic functional connectivity properties which can be extracted using resting state fmri scans and can well differentiate these autistic children from healthy children accurately.

OBJECTIVE

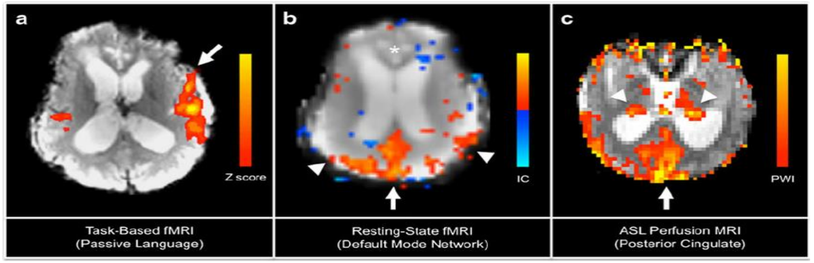
To develop a computer aided-diagnosis tool which can diagnose these disorders using resting state fMRI scans and points out the regions of the brain associated with this disease

CHALLENGES

- Behavior changes in the children do not reflect in early stages.
- Small dataset size
- Individual variability

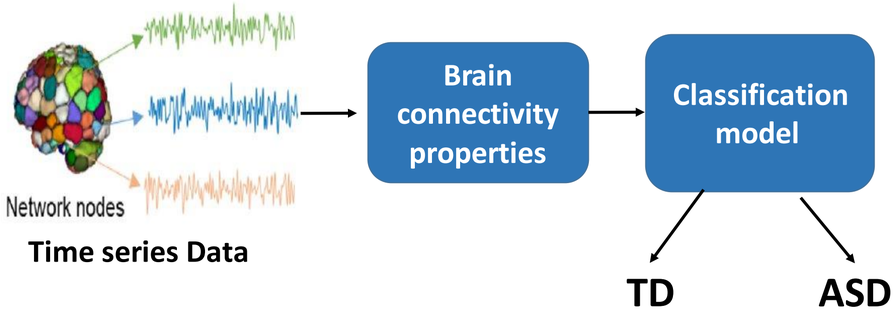
RELATED WORK

Previous studies have focused on using the functional connectivity changes across different brain regions for the classification of ASD.



METHOD

In our study, we are using ABIDE preprocessed Initiative dataset. It contains resting state fMRI scans along with the phenotypic information of 1112 subjects acquired from 17 different sites. Recent studies have shown atypical fluctuations in many Graph Theoretical Measures (GTM) like modularity, global efficiency, local efficiency, assortativity, clustering coefficients etc. along with the changes in static functional connectivity (SFC) and dynamic functional connectivity (DFC) for ASD patients. In this project we are focusing on using the variations/fluctuations observed in various feature sets like SFC, DFC and GTM as biomarkers for the classification of ASD.



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