Identifying Underlying Brain Connections in Pediatric ADHD: A Pathway to Early Diagnosis and Reduced Secondary Effects

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Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental condition affecting millions worldwide. It's marked by difficulties in attention control and impulse management, impacting daily life and development. Despite its prevalence, diagnosing ADHD can be challenging, especially for certain groups like girls, as current methods rely heavily on observable behaviors and ineffective questionnaires. This project aimed to enhance our understanding of Pediatric ADHD by analyzing brain data (EEG, fMRI) of children through development. My investigation consisted of two objectives: identifying brain connectivity patterns linked to ADHD and exploring how the disorder develops over time. To do this, I utilized Deep Learning techniques to build custom “digital models” of these brains. Then I applied feature extraction to these models to identify relationship and correlations with ADHD diagnosis. Results show that over time, brain activity in the frontopolar, parietal, occipital lobes are most telling of ADHD. Additionally, I also identified a unique relationship between the brain’s frontal cortex and the centers responsible for information processing. This analysis lays the groundwork for novel applications, such as BrainSync, which is a novel diagnostic tool that uses cognitive tests for targeted assessment of the areas identified in my study. By applying these findings, we can improve ADHD diagnosis and develop tailored interventions for better outcomes.

Awards Won:

Second Award of $2,000