Research Plan

Gray Matter Changes in Cerebral Development

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Background

Volumetric analysis is an essential neuroimaging tool for identifying and characterizing morphometric and connectivity brain changes. Due to the convenience of imaging processing software, such as FreeSurfer, standard practice is to rely on automated results. CAT12, an extension of the segmentation in SPM12, uses an internal interpolation to provide more reliable results even with low resolution images and anisotropic spatial resolutions.

The Human Connectome Project (HCP) is a major endeavor that will acquire and analyze connectivity data plus other neuroimaging, behavioral, and genetic data from 1,200 healthy adults. For this project, 20 healthy male subjects from the HCP Development dataset(HCP-D) will be studied. Demographic data, including age, also accompanied the dataset. All data is de-identified and anonymous.

Goals/Expected Outcomes

The goal of this project is to understand the tendencies of CAT12 to calculate cerebral volumes in comparison to FreeSurfer. It is expected that CAT12 results will be more reliable.

Procedures/Methods

Volumetric analysis will be performed on preprocessed T1 images of 20 healthy male subjects, ages 5-21 from the Human Connectome Project Development Dataset. MATLAB is a multi-paradigm numerical computing environment and proprietary programming language that allows the implementation of algorithms. Volumetric data, including Gray Matter Volume (GM_{vol}), White Matter Volume (WM_{vol}), and Total Intracranial Volume (TIV) will be collected using the algorithm CAT12 on MATLAB, and with FreeSurfer. GM_{vol} as calculated by CAT12 will be correlated to GM_{vol} as calculated by FreeSurfer. The potential abnormalities of these data will be identified with Bland-Altman analysis, which measures agreement.

1. Not Applicable

2. Not Applicable

3. Not Applicable

4. Not Applicable

Bibliography

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