A Visualization Tool for Brain Imaging Data from Multicenter Cohort Studies

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Brain imaging (MRI) data is a crucial tool for diagnosing and studying degenerative cognitive decline, as it can be used to analyze the relationship between various diseases and the volume and thickness of different brain regions. Existing visualization tools for brain images primarily focus on identifying characteristics of individuals or specific brain regions. However, to comprehensively compare and analyze brain imaging data collected from large-scale multicenter cohort studies, a new interactive visualization tool that integrates clinical and epidemiological data with brain imaging information is needed.

This visualization tool, developed using Python's Streamlit and Plotly, enables the integration and analysis of clinical, epidemiological, and brain imaging data from multicenter cohort studies. Users can select categorical and continuous variables for visualization and use scatter plots and box plots to easily identify patterns, trends, and outliers. Furthermore, the tool offers statistical comparisons, such as pairwise t-tests and ANOVA, based on clinical and epidemiological conditions. Through dimensionality reduction techniques like PCA, the tool visualizes multi-region data and allows researchers to identify features of brain imaging data related to clinical and epidemiological variables, providing insights into whether further processing, such as batch correction or transformation, is required.