

Visualizing latent structures of ADNI dataset in generalized association plots (GAP) and structural equation modelling (SEM)

Yi-Ju Lee

Institute of Statistical Science, Academia Sinica

Abstract

Method

This study aims to use the generalized association gap to explore the features in the spectrum of neurodegenerative disorder, Alzheimer's disease. Moreover, the features deploy to structural equation modelling to propose the possible underlying mechanisms. We adopt GAP (v0.2.7) for data exploration and LISEAL (v10) for structural equation modelling.

Materials

The data of 400 participants were acquired from Alzheimer's Disease Neuroimaging Initiative (ADNI 2). 100 participants each were diagnosed with early-onset mild cognitive impairment, late-onset mild cognitive impairment and Alzheimer's disease. Demographic data, family history, 23 assessments and their 3 features extracted by brain MRI images were used for each participants. The use of data has been officially reviewed by ADNI.

Result

Our findings support the current hypothesis that abnormality of the brain structure leads to the disturbed human behavior. 7 clusters were suggested by GAP with Person correlation. The structural equation modeling suggest that the cognitive functions such as memories and speech serve as mediate functions between grey matter volumes and behavior such as behavior execution and keeping daily habits. The significant level was corrected with Bonferroni method.

Conclusion

In this research, we explore the available health-related datasets of different features of Alzheimer's disease and critically evaluate their association for understanding the mechanisms of the disease. Soon, we hope to integrate the genetic information and features extracted by PET images to enrich our discoveries.

Keywords: Data Exploration, Generalized association plot, Alzheimer's Disease, Structured Equation Modelling