



香港中文大學統計學系

Department of Statistics

THE CHINESE UNIVERSITY OF HONG KONG

SEMINAR

DEPARTMENT OF STATISTICS
THE CHINESE UNIVERSITY OF HONG KONG

Brain Regions Identified as Being Associated With Verbal Reasoning Through the Use of Imaging Regression via Internal Variation

INVITED SPEAKERS

Dr. Xuan Bi,
Assistant Professor,
Carlson School of Management,
University of Minnesota

TIME

November 4, 2021 (Thursday) · 9:00 am - 10:00 am,

ABSTRACT

Brain-imaging data have been increasingly used to understand intellectual disabilities. Despite significant progress in biomedical research, the mechanisms for most of the intellectual disabilities remain unknown. Finding the underlying neurological mechanisms has proved difficult, especially in children due to the rapid development of their brains. We investigate verbal reasoning, which is a reliable measure of an individual's general intellectual abilities, and develop a class of high-order imaging regression models to identify brain subregions which might be associated with this specific intellectual ability. A key novelty of our method is to take advantage of spatial brain structures, and specifically the piecewise smooth nature of most imaging coefficients in the form of high-order tensors. Our approach provides an effective and urgently needed method for identifying brain subregions potentially underlying certain intellectual disabilities. The idea behind our approach is a carefully constructed concept called internal variation (IV). The IV employs tensor decomposition and provides a computationally feasible substitution for total variation, which has been considered suitable to deal with similar problems but may not be scalable to high-order tensor regression. We present our results from the analysis of a dataset based on the Philadelphia Neurodevelopmental Cohort. Our analysis identified a subregion across the cingulate cortex and the corpus callosum as being associated with individuals' verbal reasoning ability, which, to the best of our knowledge, is a novel region that has not been reported in the literature.

VENUE

Zoom ID: 606 898 8598 · Password: cuhkstat · [Zoom link](#)