Frontier of Artificial Network

Department of Data Science
香港城市大學
City University of Hong Kong

Enhance Prediction of Alzheimer's Disease with Generative AI

Invited Speaker
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Biography

Chenxi Yuan is an Assistant Professor of the Department of Informatics at Ying Wu College of Computing, New Jersey Institute of Technology (NJIT). Before joining NJIT, she was a postdoctoral researcher in the Department of Biostatistics, Epidemiology, and Informatics at the Perelman School of Medicine, University of Pennsylvania. She earned her M.S. and Ph.D. in industrial engineering from the University of Florida and Northeastern University. Her work focuses on building novel techniques for data generation, integration of multiple, heterogeneous data sources, and investigation of algorithmic fairness within deep learning architectures to improve the power to detect associations between risk factors and Alzheimer's disease and related dementias, and equitably improve health outcomes.

Abstract

Predicting progression from normal cognition to Alzheimer's disease (AD) using longitudinal data holds great promise for the early identification of high-risk patients. However, such longitudinal studies suffer from small sample sizes and sparse availability of some data elements. This problem is further compounded by missingness. Missing data poses multiple challenges for longitudinal studies of AD, such as reducing the sample size, increasing selection bias, and reducing statistical power. This is particularly problematic for populations under- represented in the data including individuals affected by AD and individuals from racial and ethnic minority groups. In this talk, I will introduce a novel generative AI model to impute missing neuroimaging data in longitudinal studies of AD. The model focuses on generating missing images at a designated single visit by conditioning one or more observed images from other time points. In addition to missingness, populations under-represented in the data, such as individuals from racial and ethnic minorities, pose challenges for longitudinal studies of AD, such as reducing the sample size, increasing selection bias, and reducing statistical power. Consequently, I will introduce a prognostic study that investigated the algorithmic fairness of machine learning models for predicting the progression of AD and discuss the opportunity of building generative AI models to augment data for under-represented groups to enhance