

Transforming Brain Disorder Treatment

Generative AI Models to Transform Alzheimer's and Schizophrenia Treatment

Knowledge-enhanced Foundation Models for Brain-related Disorders

A new study funded by the Gillings Gift aims to create advanced models for understanding and treating brain disorders like Alzheimer's Disease and schizophrenia. Despite extensive data collection, including imaging, genetics, and clinical information, uncovering the root causes and developing effective treatments remains a significant challenge. This project will leverage generative AI to develop Knowledge-enhanced Foundation Models for Brain Disorders (KFM-BD), akin to OpenAI's GPT. By integrating cutting edge AI with comprehensive data, the project seeks to enhance risk management and treatment strategies, improving outcomes and expanding the impact of public health efforts globally.

Aim One: HI-FM

Develop HI-FM, an advanced AI model to harmonize and fill in missing data from various sources. While current methods address some data inconsistencies, they lack the comprehensive accuracy needed for detailed analysis. This aim is dedicated to refining HI-FM to ensure high-quality and complete datasets across omics, imaging, and electronic health records (EHR) data, enabling more effective and precise research and healthcare strategies.

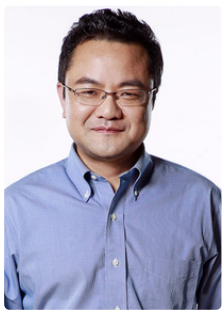
Aim Two: KGBD

Construct KGBD, an advanced AI model to create a comprehensive knowledge graph for brain disorders (BD). Existing knowledge graphs lack the depth needed for detailed BD analysis. This aim will refine KGBD by dynamically integrating data from curated databases, literature, and individual studies. By enhancing data integration across omics, imaging, and electronic health records (EHR), KGBD will enable more precise research and healthcare strategies for brain disorders.

Aim Three: KGBD-FM

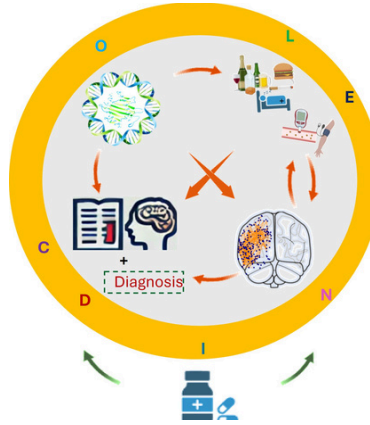
Develop KGBD-FM, an advanced AI model to enhance brain disorder research for clinical applications. This aim will integrate data from curated databases, literature, and individual studies. Key steps include identifying Alzheimer's Disease subtypes, developing early detection and progression prediction models, and assessing performance using benchmarks. This will improve the precision of brain disorder research and healthcare strategies.

Leadership



PI: Hongtu Zhu, PhD, is a professor in the Department of Biostatistics at the UNC Gillings School of Global Public Health. He also holds positions in the Departments of Radiology, Computer Science, and Genetics at UNC. As a core faculty member of the Biomedical Research Imaging Center (BRIC) and the Lineberger Comprehensive Cancer Center, Dr. Zhu's research specializes in biostatistics, AI, and neuroimaging data analysis. His work focuses on neuropsychiatric and neurodegenerative disorders and early brain development.

Co-Is: T Li, PhD; X Li, PhD; Stein, PhD; Garden, MD, PhD; Bizon, PhD; Piven, PhD



Impact!

Harnessing generative AI for brain disorder research can revolutionize public health. This project will create a powerful AI platform to analyze genetic, imaging, and clinical data, providing a comprehensive understanding of brain disorders. By integrating data from multiple sources, this tool will enable groundbreaking research and improve treatment strategies, significantly benefiting the community by advancing healthcare outcomes for those affected by these conditions.

Goal

Develop advanced AI models, Knowledge-enhanced Foundation Models for Brain Disorders (KFM-BD), and better understand and treat conditions like Alzheimer's and schizophrenia using diverse data sources.

Partners

Yun Li, PhD
 Department of Genetics and Biostatistics

