



A Multi-Modal Biomedical Knowledge Graph For Alzheimer's Disease Research

Haobo Zhang¹, Jiankun Wang¹, Zhe Huang², Qiannan Zhang², Chang Su², Fei Wang², Jiayu Zhou¹

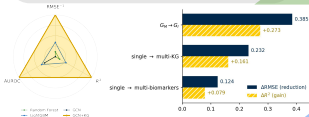
¹ University of Michigan, Ann Arbor, MI, USA ² Weill Cornell Medicine, New York, NY, USA

Background

* Alzheimer's disease research is *fragmented* across cohorts, data types, and literature, leaving critical gaps in our understanding.

* No single study captures the full complexity of the disease, spanning genes, imaging, cognition, and clinical outcomes.

* Existing knowledge graphs capture molecular and textual associations but fail to integrate neuroimaging and patient-level data



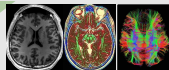
Step 1 Knowledge Extraction

Extract Alzheimer's-relevant knowledge from PubMed literature using large language models, focusing on multimodal relationships including imaging and clinical outcomes



Cohort/Data Layer

Step 3 Cohort Linking

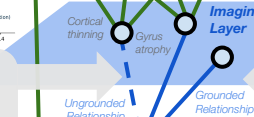


Anchor individual patients to the knowledge graph, linking their multimodal data with established biological and clinical knowledge.

Imaging Specific Layer

Step 2 Cohort grounding

Harmonize multiple Alzheimer's cohorts and use them to ground knowledge so that the extracted knowledge is supported by empirical evidence.



Conventional Knowledge Graph

Integration of Existing Knowledge Bases



Integration of Multiple Cohorts



Collaborators



Acknowledgement

This material is based in part upon work supported by the National Science Foundation under Grant IIS-2212174, National Institute of Aging (NIA) 1R01AG072449, National Institute of General Medical Sciences (NIGMS) 1R01GM145700.

