Contact

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Top Skills

- Large Language Models
- Deep Learning
- Machine Learning
- Python/R Programming
- AI in Healthcare

Languages

- English/Chinese

Certifications

- Microsoft Certified Professional
- AAIC® POSTER PRESENTER 2024
- Lean Six Sigma Yellow Belt
- Generative AI Fundamentals
- Image Noise Reduction with Auto-encoders using TensorFlow

Representative Publications

- ADAM-1: An AI Reasoning and Bioinformatics Model for Alzheimer’s Disease Detection and Microbiome-Clinical Data Integration
- The Urinary Microbiome Distinguishes Symptomatic Urinary Tract Infection from Asymptomatic Older Adult Patients Presenting to the Emergency Department
- Utilizing Latent Dirichlet Allocation and Differential Abundance to Identify Microbial Communities in both the Oral and Fecal Microbiome Associated with Alzheimer’s Disease
- Machine Learning Models for Net Photosynthetic Rate Prediction using Poplar Leaf Phenotype Data
- Multimodal Graph Neural Networks in Healthcare: A Review of Fusion Strategies Across Biomedical Domains

Ziyuan Huang

Post Doctoral Associate @ UMass Chan | PhD in Data Sciences
Greater Boston

Summary

As a Postdoctoral Associate in the Haran Lab at UMass Chan Medical School, my research applies artificial intelligence and deep learning methodologies to advance the understanding of Alzheimer's disease and other complex heterogeneous conditions. I work with multimodal data, including microbiome profiles, blood-based biomarkers, immune measures, metabolomics, clinical records, and scientific literature, using statistical learning, machine learning, and large language models. I develop frameworks such as the Alzheimer's Disease Analysis Model (ADAM) that enable comprehensive integration of these diverse data types and combine computational approaches with biological insights. This research aims to improve our understanding of disease mechanisms and develop computational approaches that may inform future therapeutic strategies for neurodegenerative diseases.

Developing AI Frameworks for Alzheimer's Research: Developed ADAM, a multi-agent reasoning framework integrating large language models with ensemble classifiers for Alzheimer's disease classification (published IEEE Access, 2025). Leading development of ADAM-2, expanding to oral/gut microbiomes, peripheral biomarkers, immune measures, and metabolomics within the ATN framework. Fine-tuning domain-specific language models on Alzheimer's literature using LoRA/QLoRA techniques with retrieval-augmented generation.

Building Scalable AI Infrastructure: Work with GPU-accelerated workstations and enterprise infrastructure for large-scale model training. Develop ensemble machine learning approaches with robust resampling for reproducibility. Maintain open-source bioinformatics frameworks with automated testing and implement reproducible workflows using version control and containerization.

Driving Research Impact Through Collaboration: Contributing to NIH-funded projects developing computational platforms for multimodal biomedical data analysis in Alzheimer's disease. Collaborating between the Department of Emergency Department and the Department of Microbiology to analyze longitudinal patient data from large cohorts. Published peer-reviewed articles on AI disease classification, microbiome analysis, and computational methodologies. Developing open-source platforms for data harmonization and interpretable AI analysis.

Experience

UMass Chan Medical School
Post Doctoral Associate

May 2023 - Present (2 years 8 months)
Worcester, MA

• Lead innovative projects at UMass Chan Medical School focused on Alzheimer's disease and aging research using artificial intelligence.
• Develop and enhance the Alzheimer's Disease Analysis Model (ADAM) framework, advancing AI-driven multimodal analysis from ADAM-1 to ADAM-2.
• Spearhead the Microbiome Differentiable Interpretable Temporal Rule Engine (MDITRE-2) to model microbiome dynamics.

Harrisburg University of Science and Technology
Part Time/Adjunct Faculty
March 2024 - Present (1 year 10 months)
Harrisburg, PA

• Develop and deliver graduate-level courses in data analytics, focusing on large language models, statistical methods, machine learning, deep learning, data visualization, explainable AI, and big data technologies.
• Mentor students in applying data-driven decision-making techniques across various industries, fostering critical thinking and technical expertise.
• Guide graduate-level thesis writing using the latest AI techniques and foster the environment for new algorithm creation.

Harrisburg University of Science and Technology
Data Science Research Fellow
January 2018 - April 2022 (4 years 4 months)
Harrisburg, Pennsylvania Area

• Collaborated with plant science experts to implement machine learning regression models for predicting net photosynthesis rates.
• Analyzed dynamic datasets with the Susquehanna River Basin Commission to support water quality improvement initiatives.
• Worked on the iguana project with the Cayman Islands Department of Environment to help preserve biodiversity.
• Applied unsupervised learning techniques to system log data to enhance internal threat detection capabilities.

Lakeland Regional Health-Florida
Data Warehouse Developer
March 2017 - October 2017 (8 months)
Lakeland, Florida

• Analyzed insurance claim denial datasets, conducting descriptive statistical analysis to enhance prediction accuracy.

• Developed and maintained the Enterprise Data Warehouse for Lakeland Regional Health, linking multiple data sources.
• Created stored procedures using R and SQL in SQL Server to generate reliable prediction results.

Citi
SQL Server Developer
February 2016 - March 2017 (1 year 2 months)
Tampa, Florida

• Developed new business logics for the Third Party Risk Assessment Process (TP-RAP) UI, enhancing database back-end logic.
• Managed ETL processes using SSIS and T-SQL across multiple environments, ensuring data integrity and accuracy.
• Collaborated with business users to gather requirements, architecting complex solutions and supporting integrated reporting for the ESC Risk landscape.

JPMorgan Chase & Co.
SQL Server Developer
August 2014 - February 2016 (1 year 7 months)
Tampa, FL

• Developed an enterprise-level SQL Reporting System for JPMC’s Control Systems Technology and Chief Operating Office.
• Utilized technologies including T-SQL, SSIS, and SSRS to facilitate data migration across various platforms.
• Created a project closure tracking system for the Commercial Investment Bank, enhancing project status visibility for senior managers.
• Collaborated with infrastructure teams to optimize and migrate databases, ensuring robust application performance.

Digital River
Business Fraud Analyst
May 2013 - July 2014 (1 year 3 months)
Minnetonka, MN

• Worked with Digital River's e-Commerce fraud prevention system to enhance security measures for online transactions.
• Developed a comprehensive fraud prevention plan focusing on customer behavior, IP address detection, and identity recognition.
• Conducted quality assurance evaluations for ASUS and Trend Micro’s online stores to improve user experience.

Metropolitan State University
Database Developer
September 2011 - May 2013 (1 year 9 months)
Greater Minneapolis-St. Paul Area

• Developed and maintained a comprehensive student information management system for Metropolitan State University.
• Designed business logic using MS-Visio to meet university requirements.
• Migrated legacy student information to new SQL Server and Access databases.
• Created a reporting system in MS-Access to reflect students' educational status for management.

EduChina Education Group
Economics Teacher
August 2010 - July 2011 (1 year)
Beijing City, China

• Developed and maintained the course syllabus for American ECON 101/202, ensuring alignment with school standards.
• Managed the Moodle learning management system to keep course content current and organized.
• Evaluated the quality of course delivery in both in-class and online formats, proposing enhancements for teaching effectiveness.

Wuxi South Ocean College
Economics Teacher
June 2009 - July 2010 (1 year 2 months)
Wuxi, Jiangsu, China

• Taught Australian economics courses (ECON 101 and 202) to enhance students' understanding of economic principles.
• Managed and maintained Moodle course sites for ECON 101 and 202, ensuring a seamless learning experience.
• Designed comprehensive course instruction plans and syllabi to align with educational standards.
• Conducted statistics tutoring sessions to support students in mastering complex concepts.

Education

Harrisburg University of Science and Technology
Doctor of Philosophy - PhD, Data Sciences · (September 2018 - April 2023)

Harrisburg University of Science and Technology

Master of Science - MS, Analytics · (June 2015 - October 2018)

Metropolitan State University

Master, Management Information Systems, System Design · (2011 - 2014)

Henderson State University

Master's degree, Business Administration and Management, General · (2007 - 2008)

Northwood University

Bachelor, Management · (2006 - 2007)

Lambton College

Associate, Business Administration · (2003 - 2006)