Chenhao Zhang

zhangch9012@gmail.com • 530-400-0112 • https://chenhaoz99.github.io/

EDUCATION

M.S. Machine Learning *2023-2024*
Carnegie Mellon University, Pittsburgh **GPA**: 3.8/4.0
Research Interests:
Machine Learning, Representation Learning, AI for Science, Molecule Design, Transformers
Relevant Coursework:
Probabilistic Graphical Model, Advanced Deep Learning, Advanced Introduction to Machine Learning, Convex Optimization, Intermediate Statistics, Representation Learning, Machine Learning in Practice

B.S. Computer Science and B.S. Mathematics *2020-2023*
University of Michigan, Ann Arbor **GPA**: 3.9/4.0
Graduated with Honors
Relevant Coursework:
Fourier Analysis, Ordinary Differential Equations, Abstract Algebra, Combinatorics, Linear Optimization, Probability, Theoretical Statistics, Artificial Intelligence, Machine Learning, Computer Vision, Deep Learning, Theory of Computation, Database Management System

EXPERIENCE

AI4Science | Prof. Barnabás Póczos *09/2023-present*
Carnegie Mellon University | *Paper Under Review*
- Controllable property optimization: combine goal-based learning with guided diffusion models.
- Molecule optimization: design a training-free method by fusing features of input molecules from arbitrary feature extractors for multi-property optimization with novel data; develop API for custom input features.
- Molecule generation: apply a non-differentiable quantum chemistry software to guided diffusion models via a zeroth-order optimization method in bilevel optimization; improve properties by 30% and stability by 6%.

Representation Learning | Prof. Pradeep Ravikumar *06/2023-present*
Carnegie Mellon University | *Prepared for JMLR and ICML*
- Transformer: investigate limitations of Transformers, explore generalization of in-context learning.
- Self-supervised learning: feed multi-source prior knowledge to encoders and prove theoretical results on extracted features; our method outperforms XGBoost by 3% on realistic tabular datasets.
- Tabular data & anomaly detection: implement a platform for tabular data processing and large-scale model training/evaluation; develop self-supervised learning algorithms and Transformers for anomaly detection.

Traffic | Dr. Henry Liu *02/2021-04/2023*
University of Michigan | *Nature Communications*
- Data platform: develop a traffic data processing platform to unify raw vehicle trajectory and map data into spatial-temporal matrices; work as a full-stack developer.
- Traffic Optimization: collaborate with Michigan Traffic Operation Center to develop a framework for traffic data processing and optimization using low-penetration vehicle data, reducing traffic congestion in Oakland County, Michigan, by 20%. (*the first paper on Nature in this field*)

- **Entrepreneurship Co-Founder** *01/2021-08/2021*
- Game design: use Unity to design and implement an RPG game *Camia* with a diverse student team. Prepare business and marketing plans for product launch.

PUBLICATIONS

- (Equal contribution) Yuchen Shen*, **Chenhao Zhang***, Sijie Fu*, Chenghui Zhou, Newell Washburn, Barnabas Poczos (2024). Chemistry-inspired Diffusion with Non-Differentiable Guidance. *arxiv preprint*.
- (Equal contribution) Yuchen Shen*, **Chenhao Zhang***, Chenghui Zhou*, Sijie Fu, Newell Washburn, Barnabas Poczos (2024). Non-Differentiable Diffusion Guidance for Improved Molecular Geometry. *ICML AI4Science Workshop*.
- Xingmin Wang, Zachary Jerome, Zihao Wang, **Chenhao Zhang**, Shengyin Shen, Vivek Kumar, Fan Bai, Paul Krajewski, Danielle Deneau, Ahmad Jawad, Rachel Jones, Gary Piotrowicz, Henry X. Liu (2024). Traffic Light Optimization with Low Penetration Rate Vehicle Trajectory Data. *Nature Communications* 15, Article number: 1306.
- Xingmin Wang, Zachary Jerome, **Chenhao Zhang**, Shengyin Shen, Vivek Vijaya Kumar, Henry X. Liu (2023). Trajectory Data Processing and Mobility Performance Evaluation for Urban Traffic Networks. *Transportation Research Record* 2677(3).

SKILLS

Coding: C/C++, C#, Python, SQL, Java, JavaScript, HTML & CSS, R, MATLAB
Language: Chinese (Mandarin), English

TALKS

- "Arterial Mobility Performance Evaluation Using the Connected Vehicle Trajectory Data." *University of Michigan Transportation Research Institute Research Symposium.* August 2021.

HONORS & AWARDS

University Honors *2020, 2021, 2022*
University of Michigan, Ann Arbor (3.5+ GPA)

EECS Scholars *2021, 2022*
University of Michigan, Ann Arbor (3.9+ GPA)

James B. Angell Scholar *2022*
University of Michigan, Ann Arbor (straight A's in two or more consecutive terms)

Distinct Graduation *2023*
University of Michigan, Ann Arbor (top 25%)