Lucy Hao

lhao03.github.io
lhao03@student.ubc.ca

Education

University of British Columbia — Vancouver, Canada
B.Sc. in Combined Chemistry and Computer Science — 2019 - 2025

Publications

1. Zhang, W.; Guy, M. A.; Yang, J.; **Hao, L.**; Liu, J.; Hawkins, J.; Mustakis, I. G.; Monfette, S.; Hein, J. E. Leveraging GPT-4 to Transform Chemistry from Paper to Practice. *Digital Discovery* **2024**. https://doi.org/10.1039/d4dd00248b.
2. Chen, Y.; **Hao, L.**; Zou, V. Z.; Hollander, Z.; Ng, R. T.; Isaac, K. V. Automated Medical Chart Review for Breast Cancer Outcomes Research: A Novel Natural Language Processing Extraction System. *BMC Medical Research Methodology* **2022**, 22 (1). https://doi.org/10.1186/s12874-022-01583-z.

Research Experience

Hein Lab | Vancouver, BC — 2024.05 - curr.

- Currently automating high-performance liquid chromatography (HPLC) method development via Bayesian optimization.
- Contributing to development and conceptualization of the lab's vision for self-driving laboratories.
- Designed and developed tool to convert workflows from natural language to executable code for self-driving labs using Large Language Models (LLMs) and automated planning.
- Demoed tool to process chemistry industry professionals and presented poster of methodology at Accelerate Conference 2024.
- Advisor: Prof. Jason E. Hein

Research Learning Experience (CHEM 445) | Vancouver, BC — 2024.09 - 2024.12

- Added alternative self-consistent field (SCF) convergence methods from literature to Psi4, an open-source quantum chemistry library.
- Implemented minimal error sampling algorithm (MESA) over several SCF convergence methods based on previous literature.
- Advisor: Prof. Yan (Alexander) Wang

UBC iGEM | Vancouver, BC — 2022.11 - 2024.11

- Ideated and pitched enzymatic DNA storage platform project (nuCloud), winning majority vote of the team.
- Designed and led implementation of DNA software pipeline that uses encoding strategies to avoid repeated bases.
- Spearheaded sustainable development goals initiative focusing on green chemistry principles and green engineering processes.
- Awarded Biomanufacturing Village Nomination (top 5 out of 48 teams), Best Sustainable Development Impact, Best Hardware, and Gold Medal.
- Performed molecular dynamics simulations using GROMACS on high-performance computing cluster.
- Advisor: Prof. Steven J. Hallam

PROOF Centre | Vancouver, BC — 2021.01 - 2021.05

- Re-implemented fragile and non-generalizable natural language processing (NLP) pipeline by adding optical character recognition, custom generated regular expressions, and biomedical word embeddings to automate the categorization of key phrases from structured electronic health records (EHRs).
- Improved NLP pipeline accuracy to **91%** on test set of 50 EHRs based on training set of only 50 EHRs.
- Performed statistical analysis on results as well as helped write the Methods, Results, and Discussion sections of published paper.

- Awarded Biotalent Canada Student Work Placement Program Grant of $5000 for this project.
- Advisors: Dr. Zsuzsanna Hollander, Prof. Raymond T. Ng

Industry Experience

Capital One | New York City, NY 2022.06 - 2022.08

- Piloted use of AWS Device Farm, creating end-to-end automated testing solutions for mobile app verification, developing skills in cloud-based testing environments.
- Collaborated with senior engineers to create and implement parallelized automated tests, optimizing testing processes to reduce development time.
- Communicated findings on AWS Device Farm's capabilities and limitations to upper-level technical executives, deepening understanding of strategic decision-making in technology adoption.

Microsoft | Vancouver, BC 2021.05 - 2021.08

- 1/50 North American interns selected for Microsoft's Garage Internship Program
- Conducted user surveys to establish user requirements for internally requested tool to expose capabilities of the Microsoft Graph API to Microsoft Teams developers.
- Worked with senior engineers, project managers, and 6 interns to develop Microsoft Teams App, creating a sandbox environment for seamless experimentation with the Microsoft Graph API.
- Discovered and fixed bug displaying invalid API endpoints due to incorrect user permission type for browser-based Microsoft Graph API sandbox tool, improving the user experience.
- Adding linting and style pre-commit hook tools to save review time of PRs.

Presentations

- AI-Driven Workflow Planning for Robotic Arms in Self-Driving Labs, **Accelerate Conference 2024** 2024.08

Teaching Assistantships

- **CPSC 110**, Systematic Program Design 2022.08 - 2022.12
- **CPSC 110**, Systematic Program Design 2021.08 - 2021.12
- **CPSC 210**, Software Construction 2021.07 - 2021.08
- **CPSC 210**, Software Construction 2021.01 - 2021.05

Other

- **Advisor**, UBC iGEM 2024.11 - curr.
- **Director of Marketing**, nwPlus 2021.08 - 2022.03
- **Director of Marketing and Technology**, StarHacks 2020.09 - 2022.01
- **Hackathon Workshop Host**, StarHacks I/II, Citro Hacks, Hydrangea Hacks, Hacking 4 Community, HackCamp 2021 - 2022
- **Software Team Lead**, UBC BEST 2020.10 - 2021.09
- **Mentor**, nwPlus (connect-f) 2020.07 - 2021.04
- **Instructor Trainee I**, Math Tutor Network 2019.09 - 2020.06
- **English Tutor**, Equalearn Foundation 2017.09 - 2019.08