Patrick Soga

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Education

University of Virginia — Aug 2023 – Present
Ph.D. in Computer Science – 3.96/4.0. Advised by Jundong Li. — *Charlottesville, VA*

University of Notre Dame — Aug 2018 – Jan 2023
B.S. Computer Science, B.A. Philosophy – 3.85/4.0, Cum Laude. — *Notre Dame, IN*

Publications

* indicates equal contribution.

1. Zhenyu Lei, **Patrick Soga**, Yaochen Zhu, Yinhan He, Yushun Dong, and Jundong Li. MolEdit: Knowledge Editing for Multimodal Molecule Language Models. In *WSDM 2026.*
2. **Patrick Soga**, Zhenyu Lei, Yinhan He, Camille Bilodeau, and Jundong Li. Energy-Based Models for Predicting Mutational Effects on Proteins. In *KDD 2025.*
3. **Patrick Soga**, Yushun Dong, Yaochen Zhu, Jundong Li, Tong Zhao, and Neil Shah. VirtualGCN – Enhancing Graph Collaborative Filtering with Virtual Interactions. In *IEEE Big Data 2025.*
4. Yushun Dong, **Patrick Soga**, Yinhan He, Song Wang, and Jundong Li. Graph Neural Networks Are More Than Filters: Revisiting and Benchmarking from A Spectral Perspective. In *ICLR 2025.*
5. **Patrick Soga**, Zhenyu Lei, Camille L. Bilodeau, and Jundong Li. Deep Interactions for Multimodal Molecular Property Prediction. In *PAKDD 2025.*
6. Yinhan He, Zaiyi Zheng, **Patrick Soga**, Yaochen Zhu, Yushun Dong, and Jundong Li. Explaining Graph Neural Networks with Large Language Models: A Counterfactual Perspective on Molecule Graphs. In *EMNLP 2024 (Findings).*
7. Jennifer J. Schnur*, Angélica Garcia-Martínez*, **Patrick Soga***, Karla Badillo-Urquiola*, et al. SaludConectaMX: Lessons Learned from Deploying a Cooperative Mobile Health System for Pediatric Cancer Care in Mexico. In *CSCW 2024.*
8. **Patrick Soga** and David Chiang. Bridging Graph Position Encodings for Transformers with Weighted Graph-Walking Automata. In *TMLR, 2023.*
9. Steven Krieg, William Burgis, **Patrick Soga**, and Nitesh Chawla. Deep Ensembles for Graphs with Higher-order Dependencies. In *ICLR 2023.*

Work Experience

Lucy Family Institute for Data and Society — June 2021 – May 2022
Software Developer — *Notre Dame, IN*

- Built web (React) and mobile (Flutter) apps for gathering and managing patient medical information and assessing cancer patient risk for HIMFG, a premier hospital in Mexico City, Mexico.
- Currently deployed with >100 users and records. Resulted in [7].

FloVision Solutions — July 2021 – March 2022
ML & Software Engineer — *Remote*

- Wrote Google Cloud Function pipelines for automating annotations and deployed inference jobs with Docker on Google Cloud Compute Engine VMs.
- Tuned CNN architectures using transfer learning techniques for food image classification for waste reduction.

Million Marker — February 2021 – May 2021
Software Engineering Intern (part-time) — *Palo Alto, CA*

- Developed OCR functionality using Google's Tesseract and Amazon's Textract for extracting ingredients from product labels.

RJ Reliance — December 2020 – February 2021
Software Development Intern — *Remote*

- Wrote Python scripts to generate datasets detailing job requisitions, job applications, and other data pertaining to HR for showcasing core company products.
- Designed, implemented, and deployed a React web frontend and corresponding NodeJS REST API with a MongoDB database on Heroku for showcasing and working with the data.

Research Experience

Snap Collaboration
February 2024 – October 2024

- Developed a novel GCN-inspired matrix factorization method for graph collaborative filtering-based recommendation under supervision of Snap research scientists. Resulted in [3].

Teaching

- TA for CS 4774 Machine Learning, Spring 2025
- TA for CS 6316 Machine Learning, Fall 2025

Academic Service

- Reviewer for ICLR 2026, CIKM 2025 Demo Track, WWW 2025, ICML 2025, ACML 2025, ACML 2024, ICLR 2024 Tiny Papers Track, and TMLR.
- External reviewer for KDD 2024-2025, IJCAI 2024, WSDM 2024, and DSAA 2024.

Skills

Programming & Frameworks: Python, PyTorch, PyTorch Geometric, Deep Graph Library (DGL), RDKit, Biopython, Biotite, C, JavaScript, TypeScript, PostgreSQL, ReactJS, Angular, NodeJS, Flask

Software & Tools: Git, Ubuntu, SLURM, Google Cloud Platform (Cloud Functions, Compute Engine, Firestore), AWS (S3, Lambda, EC2), AlphaFold

Awards & Distinctions

- Phi Beta Kappa, Spring 2023

Miscellaneous

- Citizenship: United States of America
- Languages: English (native), Japanese (basic)