

# Patrick Soga

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## Education

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### University of Virginia

*Ph.D. in Computer Science – 3.96/4.0. Advised by Jundong Li.*

Aug 2023 – Present

*Charlottesville, VA*

### University of Notre Dame

*B.S. Computer Science, B.A. Philosophy – 3.85/4.0, Cum Laude.*

Aug 2018 – Jan 2023

*Notre Dame, IN*

## Publications

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\* indicates equal contribution.

1. Patrick Soga, Zhenyu Lei, Yinhan He, Camille Bilodeau, and Jundong Li. Energy-Based Models for Predicting Mutational Effects on Proteins. In *KDD 2025*.
2. 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*.
3. 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*.
4. Patrick Soga, Zhenyu Lei, Camille L. Bilodeau, and Jundong Li. Deep Interactions for Multimodal Molecular Property Prediction. In *PAKDD 2025*.
5. 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)*.
6. 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*.
7. Patrick Soga and David Chiang. Bridging Graph Position Encodings for Transformers with Weighted Graph-Walking Automata. In *TMLR, 2023*.
8. Steven Krieg, William Burgis, Patrick Soga, and Nitesh Chawla. Deep Ensembles for Graphs with Higher-order Dependencies. In *ICLR 2023*.

## Work Experience

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### 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 CSCW 2024 publication.

### 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

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### 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 paper in submission.

## Teaching

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

## Academic Service

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- 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

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**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

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- Phi Beta Kappa, Spring 2023

## Miscellaneous

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