

# Patrick Soga

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## Education

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### University of Virginia

*PhD. in Computer Science. Advisor: Jundong Li.*

August 2023 – Present

*Charlottesville, VA*

### University of Notre Dame

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

August 2018 – Jan 2023

*Notre Dame, IN*

## Publications

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1. Patrick Soga and David Chiang. Bridging Graph Position Encodings for Transformers with Weighted Graph-Walking Automata. In *Transactions on Machine Learning Research*, 2023.
2. Steven Krieg, William Burgis, Patrick Soga, and Nitesh Chawla. Deep Ensembles for Graphs with Higher-order Dependencies. In *The Eleventh International Conference on Learning Representations*, 2023.

## Research Experience

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### Notre Dame Department of Computer Science

*Undergraduate Research Assistant*

February 2022 – December 2022

*Notre Dame, IN*

- Developed a novel graph automaton-based positional encoding for transformers on graphs with Prof. David Chiang generalizing previous positional encodings in the ML literature.
- Contributed to an ensemble-based graph neural network architecture for higher-order networks (HONs) under Prof. Nitesh Chawla and one of his graduate students, outperforming current methods on node classification and link prediction.

### REU at Notre Dame

*REU Participant*

June 2020 – August 2020

*Remote*

- Participated in NSF-funded research project under Prof. Jane Cleland-Huang for developing software for guiding drones assigned to emergency response missions.
- Trained weather classification models for video provided by drones.

## Work Experience

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### Lucy Family Institute for Data and Society

*Software Developer*

June 2021 – May 2022

*Notre Dame, IN*

- Wrote web and mobile apps for gathering and managing patient medical information and assessing cancer patient risk.
- Apps are currently used by a hospital in Mexico City, Mexico by over 100 medical staff and families.
- Human-computer interaction paper in submission.

### FloVision Solutions

*ML & Software Engineer*

July 2021 – March 2022

*Remote*

- Wrote and deployed Python scripts and infrastructure for automating inference of thousands of food images and videos using Google Cloud Compute Engine and Docker.
- Tuned CNN architectures using transfer learning techniques for recognizing and classifying images of food with TensorFlow for food waste reduction.
- Fixed bugs in visualizing thousands of data points for clients with React.js, Cube.js, and Google Firebase.

### Million Marker

*Software Engineering Intern (part-time)*

February 2021 – May 2021

*Palo Alto, CA*

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

## RJ Reliance

*Software Development Intern*

December 2020 – February 2021

*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 on Heroku.

## Volunteering

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### CS for Good

August 2019 – August 2020

*Non-Profit Service Project, Team Member*

*South Bend, IN*

- Worked in a team of 4 to create a database and dashboard for Guate Te Incluye, a non-profit organization helping recently deported Guatemalan migrants reintegrate into the labor force.
- Wrote API endpoints in NodeJS for managing data of over 1100 workers.

## Skills

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**Programming Languages & Frameworks:** PyTorch, Keras, TensorFlow, Python, C, Dart, JavaScript, TypeScript, Bash, PostgreSQL, SQLAlchemy (ORM) ReactJS, Angular, AngularJS, NodeJS, Flask

**Software & Tools:** Git, Ubuntu, Google Cloud Platform, Amazon Web Services, Google Firebase, L<sup>A</sup>T<sub>E</sub>X, Vim, Docker

## Awards, Distinctions, and Activities

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- Phi Beta Kappa, spring 2023
- iTREDS Scholar: competitive program for training students in data science for social good
- Building Bridges peer mentor (2021-2022): mentorship program for demographically underrepresented first-year students in computer science
- Silicon Valley Semester (spring 2021): 1 of 27 selected computer science majors at Notre Dame to work a part-time internship at a tech startup in Palo Alto, California concurrently with coursework
- Philosophy club president (fall 2020): recruited students and organized and led a reading group in Eastern philosophy
- Dean's List (2018-2021)

## Miscellaneous

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- Citizenship: U.S.A.
- Languages: English (native), Japanese (basic)