Patrick Soga

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Education

University of Virginia August 2023 – Expected May 2028
PhD. in Computer Science. Advisor: Jundong Li. *Charlottesville, VA*

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

Publications

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

Notre Dame Department of Computer Science February 2022 – December 2022
Undergraduate Research Assistant *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 June 2020 – August 2020
REU Participant *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

Lucy Family Institute for Data and Society June 2021 – May 2022
Software Developer *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 July 2021 – March 2022
ML & Software Engineer *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 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 on Heroku.

Volunteering

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

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, LaTeX, Vim, Docker

Awards, Distinctions, and Activities

- 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

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