Alaia Solko-Breslin

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Levine 575, 3330 Walnut St ◇ Philadelphia, PA 19104

EDUCATION

University of Pennsylvania Fall 2022 - Present
Ph.D. in Computer and Information Science
Advisors: Rajeev Alur and Mayur Naik

Cornell University Fall 2021 - Spring 2022
M.Eng. in Computer Science
GPA: 4.08

Cornell University Fall 2018 - Spring 2021
B.S. in Computer Science
Minor in Applied Mathematics
GPA: 3.81

RESEARCH INTERESTS

My research interests involve machine learning, programming languages, and formal methods. I am currently interested in neurosymbolic learning, a paradigm that combines neural and symbolic approaches to improve the accuracy and interpretability of machine learning models. I am currently working on the problem of approximating gradients of black-box functions to with the goal of making neurosymbolic learning possible with non-differentiable programs.

RESEARCH EXPERIENCE

Neurosymbolic Learning with Black-Box Programs Fall 2022 - Present
University of Pennsylvania

- Designing and implementing an algorithm for neurosymbolic learning with non-differentiable programs.
- Testing our algorithm on an extensive benchmark suite, which includes synthetic and real-world tasks.
- Working under Rajeev Alur and Mayur Naik.

L* + Blanks ($L^*_\square$) and Petr4 Spring 2020 - Spring 2022
Cornell University

- Contributed to the development of the $L^*_\square$ algorithm, inspired by the Maler-Pnueli version of L*, that learns finite automata from a set of example strings. Worked under Nate Foster and Alexandra Silva.
- Developed a framework for testing the semantics of the Petr4 interpreter. Worked under Nate Foster.

PUBLICATIONS

- *Beyond Differentiability: Neurosymbolic Learning with Black-Box Programs* Under Review
  Alaia Solko-Breslin, Ziyang Li, Neelay Velingker, Rajeev Alur, Mayur Naik
- *Automata Learning with an Incomplete Teacher* [paper] ECOOP 2023
  Mark Moeller, Thomas Wiener, **Alaia Solko-Breslin**, Caleb Koch, Nate Foster, Alexandra Silva.
- *Petr4: Formal Foundations for P4 Data Planes* [paper] POPL 2021
  Ryan Doenges, Mina Tahmasbi Arashloo, Santiago Bautista, Alexander Chang, Newton Ni, Samwise Parkinson, Rudy Peterson, **Alaia Solko-Breslin**, Amanda Xu, Nate Foster.

WORK EXPERIENCE

Amazon Web Services Summer 2021
Software Development Engineer Intern

- Implemented an API that performs a deep health check of our authentication service.
- Implemented canaries that would continuously make requests to this health check and our service and report metrics.

Amazon Web Services Summer 2020
Software Development Engineer Intern

- Designed and implemented an API that allows test fleets to obtain the posture that is necessary for them to reach services in Native AWS.

TEACHING

University of Pennsylvania
Teaching Assistant

- CIS 7000: Special Topics: Trustworthy Machine Learning — Spring 2024
  Instructors: Rajeev Alur and Osbert Bastani
- CIS 5000: Software Foundations — Fall 2023
  Instructor: Benjamin Pierce
  Lectures taught: "Induction and data structures" — September 2023

Cornell University
Teaching Assistant

- CS 4160/5160: Formal Verification — Spring 2022
  Instructor: Michael Clarkson
- CS 3110: Data Structures and Functional Programming — Fall 2021
  Instructor: Michael Clarkson
- CS 4820: Introduction to Analysis of Algorithms — Spring 2021
  Instructor: Robert Kleinberg
- CS 4820: Introduction to Analysis of Algorithms — Fall 2020
  Instructor: Dexter Kozen
- CS 3110: Data Structures and Functional Programming — Spring 2020
  Instructor: Nate Foster
- CS 3110: Data Structures and Functional Programming — Fall 2019
  Instructor: Michael Clarkson

SERVICE

CIS TGIF Event Coordinator June 2023 - Present
Organize weekly social dinners for CIS Ph.D. students, postdocs, and faculty.

CIS Office Committee Member May 2023 - Present
Coordinate office assignments for CIS Ph.D. students and postdocs.

PLDI Student Volunteer June 2023
Assisted with conference sessions to address technical difficulties and keep talks running on schedule.

AWARDS

Summer School on Formal Techniques Funding 2023
Received funding to travel to and attend the SSFT summer school.

Programming Languages Mentoring Workshop at PLDI Funding 2022
Received funding to travel to and attend PLMW at PLDI.

John Grist Brainerd Doctoral Fellowship (UPenn) 2022
Donor-named fellowships like these provide a one-time $3,000 award. This honor and award is in recognition of outstanding academic accomplishments and research potential.

TECHNICAL SKILLS

Programming Languages	Python, Java, OCaml, Rust, Coq, Ruby, Racket, Dafny, C
Tools	Pytorch, Git, LaTeX

REFERENCES

Mayur Naik
Professor
University of Pennsylvania, Department of Computer and Information Science
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Rajeev Alur
Professor
University of Pennsylvania, Department of Computer and Information Science
alur@seas.upenn.edu