Paul Krogmeier

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https://paulkrog.github.io

EDUCATION

University of Illinois Urbana-Champaign — Expected Fall 2024
Ph.D. in Computer Science (advisor: Madhusudan Parthasarathy).
Ph.D. Thesis: Theory and Algorithms for Symbolic Learning.

Purdue University
M.S. in Computer Engineering (advisor: Benjamin Delaware). — 2016–2018
M.S. Thesis: A Core Calculus for Data Refinement.
B.S. in Computer Engineering (with highest distinction). — 2012–2016

RESEARCH INTERESTS

My interests are in the foundations of **symbolic learning and reasoning**, with a focus on the problem of learning symbolic concepts that describe **structured data** like sequences, trees, graphs, or states of computer programs. This encompasses program synthesis from examples as well as learning classifiers expressed in logic. Recently, I have been exploring how to **synthesize domain-specific languages** to support efficient few-shot symbolic learning.

AWARDS

ACM SIGPLAN Distinguished Paper Award at OOPSLA — 2023
ACM SIGPLAN Distinguished Paper Award at POPL — 2022
Illinois Wing Kai Cheng Fellowship — 2018
Purdue Ross Fellowship — 2016

REFEREED CONFERENCE PUBLICATIONS

Paul Krogmeier and P. Madhusudan. 2023. Languages with Decidable Learning: A Meta-theorem. Proc. ACM Program. Lang. 7, OOPSLA1, Article 80 (April 2023), 29 pages. https://doi.org/10.1145/3586032
ACM SIGPLAN Distinguished Paper Award.

Paul Krogmeier*, Zhengyao Lin*, Adithya Murali*, and P. Madhusudan. 2022. Synthesizing axiomatizations using logic learning. Proc. ACM Program. Lang. 6, OOPSLA2, Article 185 (October 2022), 29 pages. https://doi.org/10.1145/3563348

Adithya Murali, Atharva Sehgal, Paul Krogmeier, P. Madhusudan. Composing Neural Learning and Symbolic Reasoning with an Application to Visual Discrimination. Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence Main Track (IJCAI). Pages 3358-3365. https://doi.org/10.24963/ijcai.2022/466

Paul Krogmeier and P. Madhusudan. 2022. Learning formulas in finite variable logics. Proc. ACM Program. Lang. 6, POPL, Article 10 (January 2022), 28 pages. https://doi.org/10.1145/3498671
ACM SIGPLAN Distinguished Paper Award.

Gilles Barthe, Rohit Chadha, Paul Krogmeier, A. Prasad Sistla, and Mahesh Viswanathan. 2021. Deciding accuracy of differential privacy schemes. Proc. ACM Program. Lang. 5, POPL, Article 8 (January 2021), 30 pages. https://doi.org/10.1145/3434289

Krogmeier, P., Mathur, U., Murali, A., Madhusudan, P., Viswanathan, M. (2020). Decidable Synthesis of Programs with Uninterpreted Functions. In: Lahiri, S., Wang, C. (eds) Computer Aided Verification. CAV 2020. Lecture Notes in Computer Science, vol 12225. Springer, Cham. https://doi.org/10.1007/978-3-030-53291-8_32

Umang Mathur, Adithya Murali, Paul Krogmeier, P. Madhusudan, and Mahesh Viswanathan. 2019. Deciding memory safety for single-pass heap-manipulating programs. Proc. ACM Program. Lang. 4, POPL, Article 35 (January 2020), 29 pages. https://doi.org/10.1145/3371103

WORKSHOP PUBLICATIONS

Paul Krogmeier, Steven Kidd, Benjamin Delaware.
Towards Context-Aware Data Refinement.
CoqPL 2018

WORK IN PROGRESS

Paul Krogmeier and P. Madhusudan.
Synthesizing DSLs for Few-Shot Learning.
Algorithms for synthesizing domain-specific languages that can be learned efficiently from few examples.
In preparation.

Paul Krogmeier.
Computing with Abstractions.
A new model of computation to study how abstractions emerge in an evolving computation.
In preparation.

INVITED TALKS

Learning Symbolic Concepts and Domain-specific Languages	George Mason CS, Oct 24 Santa Fe Institute, Jun 24 MIT EECS, Apr 24 Houston CS, Apr 24 Purdue ECE/CS, Mar 24
Languages with Decidable Learning: a Meta-theorem	Boston U. CS, Mar 23
Learning Formulas in Finite-Variable Logics	St. Petersburg State University, Mar 22

INVITED WORKSHOPS

Dagstuhl seminar Fall 2019
Logic and Learning

TEACHING

CS 421: Programming Languages and Compilers	**University of Illinois** Fall 2019, Fall 2020, Spring 2021, Fall 2021 Spring 2022, Fall 2022, Spring 2023, Fall 2023, Fall 2024
ECE 369: Discrete Mathematics for Computer Engineering	**Purdue University** Fall 2017

SERVICE

Journal Reviewer

Formal Methods in System Design (FMSD)	2023

Conference Reviewer

International Colloquium on Automata, Languages and Programming (ICALP)	2023
Logic in Computer Science (LICS)	2022

MENTORING

SIGPLAN-M Graduate Student Mentor	2023 – Present

STUDENT WORKSHOPS

VMCAI Formal Methods Winter School — New Orleans, LA, Jan 2020

SRI Formal Methods Summer School — Atherton, CA, May 2019

Oregon Programming Languages Summer School — Eugene, OR, Jun 2017

MISCELLANY

Native English speaker, fluent in Spanish, conversational in German.
Jazz alto saxophonist with substantial performance and teaching experience.
Lover of snow, mountains, and skiing.