Krzysztof Drewniak

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Citizenship: United States and Poland

Education

University of Washington **2018-Present**
PhD in Computer Science Seattle WA
Advised by Dr. Rastislav Bodik. Program synthesis applied to high-performance and numerical computing.

Currently developing abstract dynamic programming, a new synthesis technique for accelerating enumerative searches over some program spaces, and applying it to numerical kernel synthesis for GPUs.

The University of Texas at Austin **2014–2018**
BS in Computer Science Austin, TX
BS in Mathematics
GPA: 3.96/4.0
Turing Scholars Honors Program, Department of Computer Science

Honors thesis: GEMM3: Constant-Workspace High-Performance Multiplication of Three Matrices for Matrix Chaining
Advised by Dr. Robert van de Geijn.

Texas Academy of Mathematics and Science **2012–2014**
Residential early college program Denton, TX
GPA: 4.0/4.0

Publications

1. Tze Meng Low, Krzysztof Drewniak, *et al.* "Deriving High Performance Fused Algorithms via Loop Invariants". In preparation for submission to IEEE International Parallel & Distributed Processing Symposium (IPDPS) in May 2020.
2. Krzysztof Drewniak. "GEMM3: Constant-Workspace High-Performance Multiplication of Three Matrices for Matrix Chaining". Honors Thesis HR-18-01, Department of Computer Science, The University of Texas at Austin, Austin, Texas, April 2018. https://apps.cs.utexas.edu/apps/tech-reports/106256
3. Krzysztof Drewniak, Joseph Helsing, and Armin R. Mikler. "A method for reducing the severity of epidemics by allocating vaccines according to centrality". In *Proceedings of the 5th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics, BCB '14*, pgs. 341–350, New York, NY, USA, 2014. ACM.

Experience

Academic Experience

Carnegie Mellon University **Feb 2018–Jun 2018**
Visiting Undergraduate Researcher Pittsburgh, PA
Department of Electrical and Computer Engineering
Developed an automated high-level loop fusion analysis method based on loop invariants for algorithms in linear algebra and similar fields.
Results are expected to appear as part of a publication currently being prepared for submission to IPDPS.

RWTH Aachen **Sep 2017–Jan 2018**
Visiting Undergraduate Researcher Aachen, Germany
High-Performance and Automatic Computing group, Aachen Institute for Advanced Study in Computational Engineering Science
Investigated methods for the automatic generation of code to efficiently normalize linear algebra expressions from axioms, primarily by attempting to synthesize a confluent system of term rewriting rules.

The University of Texas at Austin **Aug 2016–May 2018**
Undergraduate Research Assistant Austin, TX
Science of High-Performance Computing group, Institute for Computational Engineering and Sciences
Investigated techniques for improving the efficiency of fused matrix and vector operations. Key result was an algorithm for $D \mathrel{+}= ABC$ in constant additional workspace, attaining increased performance.

The University of Texas at Austin **Jan 2016–May 2016**
Teaching Assistant Austin, TX
CS 429H, Honors Computer Architecture

University of North Texas **Jun 2013–May 2014**
Undergraduate Research Assistant Denton, TX
Computational Epidemiology Research Lab
Investigated strategies for the geographical allocation of vaccines in order to reduce epidemic spread in simulation.

Industry Experience

Google **Summer 2019**
Intern, MLIR group Mountain View, CA
Investigated methods for constructing loop tilings around mathematical kernels using dynamic programming. Developed a Tensorflow Lite to Multi-Level Intermediate Representation (MLIR) translator.

Honors and Awards

Anne Dinning-Michael Wolf Endowed Regental Fellowship **2018**

University of Washington, Department of Computer Science and Engineering

Service

Allen School Diversity Committee **Sep 2019–Present**
Learning and applying best practices to improve the admission and retention of graduate students from underrepresented populations. **AccessComputing Oct 2018–Present**
Community focused on increasing access to computer science for people with disabilities.