

Computer Science Graduate Seminar

(the first)

Department of Computer Science
University of Western Ontario

November 6 2020

Agenda

13:00 Coffee & Chats

13:20 Introductions

13:30 Brent Davis

Decision-Directed Data Decomposition

14:30 Andrew Bloch-Hansen

High Multiplicity Strip Packing

15:00 Alex Brandt

Parallel Programming and Triangular Decompositions

15:30 Linxiao Wang

Computing the integer hull of a parametric polyhedron

16:00 Trivia and Conclusions

Decision-Directed Data Decomposition

Brent Davis

- We present an algorithm, Decision-Directed Data Decomposition (D4), which decomposes a dataset into two components. The first contains most of the useful information for a specified supervised learning task. The second orthogonal component contains little information about the task but retains associations and information that were not targeted. The algorithm is simple and scalable. We illustrate its application in image and text processing domains. Our results show that 1) post-hoc application of D4 to an image representation space can remove information about specified concepts without impacting other concepts, 2) D4 is able to improve predictive generalization in certain settings, and 3) applying D4 to word embedding representations produces state-of-the-art results in debiasing.

High Multiplicity Strip Packing

Andrew Bloch-Hansen

- We briefly review the concepts of algorithm design, analysis of algorithms, and approximation algorithms. Then, we introduce the high multiplicity strip packing problem and our research on it.

Parallel Programming and Triangular Decompositions

Alex Brandt

- The triangular decomposition method for solving systems of non-linear equations combines low-level arithmetic routines with high-level procedures which produce different components (points, curves, surfaces) describing the solution set. To obtain high-performance, we propose component-level parallelization, where operations proceed on each geometric component separately. Unfortunately, this parallelization is irregular, thus requiring cooperative and load-balancing parallel programming patterns including workpile, producer-consumer, and fork-join.

Computing the integer hull of a parametric polyhedron

Linxiao Wang

- We introduce the concept of finding the integer hull in a rational polyhedron and the difficulty of doing so in a parametric case. Then, we present our current research towards finding a solution to this problem.