Ryan H. Lewis

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Education

◇ **Stanford University**, Stanford, C.A.
Graduate Student in Computational Mathematics, expected May 2017.
Applied & Computational Topology Group, I.C.M.E.
Advisor: Gunnar Carlsson.

◇ **Dartmouth College**, Hanover, N.H.
Former PhD Student in Computational Topology, originally expected May 2015.
Theory Group, Department of Computer Science.
Advisor: **Former** Prof. Afra J. Zomorodian

◇ **Rochester Institute of Technology,** Rochester, N.Y.
M.S. in Applied & Computational Mathematics, completed May 2010.
Thesis: Topological & Network Theoretic Methods for Hyperspectral Data Analysis
B.S in Computational Mathematics completed May 2010.
Advisor: Prof. Anthony A. Harkin

Publications

There are No Multiply-Perfect Fibonacci Numbers. Broughan, K.A. and González, M.J. and Lewis, R.H. and Luca, F. and Mejía Huguet, V.J. and Togbé, A. *Integers*, 11(3):363-397, 2011.

Awards & Honors

National Poster Session Winner SIAM Annual Meeting, 2009, Total awards given: Three

Pi Mu Epsilon: Mathematics Honor Society Inductee Year Awarded: 2007

Research

Multicore Homology Generic C++, OpenMP, STL, TBB

- Designed and implemented a framework for the computation of the homology of a space in parallel.
- Homology is an algebraic construction used for understanding the shape and is useful for modeling problems in data analysis, ad-hoc wireless sensor networks, image analysis, and more.
- Initial implementation achieves a 8× speedup over serial computation and is 73% efficient.
- Proved NP-Completeness result for finding α-balanced blowups used for parallel computation.

Advisor: Prof. Afra J. Zomorodian *(In preparation)*

Topological & Network Theoretic Methods for Hyperspectral Image Segmentation, C++

- Implemented a deterministic method for segmenting a hyperspectral image into classes of pixels which are spectrally similar.
- A hyperspectral sensor measures hundreds of wavelengths of light from ultraviolet to infrared, and is used in agriculture, mineralogy, surveillance, physics, chemical imaging, environmental modeling, capturing Osama Bin Laden, and more.

Advisor: Prof. Anthony A. Harkin *(Masters Thesis)*

Topological Anomaly Detection In Hyperspectral Imagery, C++

- Implemented an algorithm for finding anomalous objects in hyperspectral images.

- A heuristic version of this algorithm is now used in IDL/ENVI the leading tool used in remote sensing for the analysis of imagery.

Advisor: Prof. William F. Basener

Teaching Experience

CME 194: Introduction to MPI (Spring 2013-2014)

- Designed a four week one unit course on programming.
- Course covers the Message Passing Interface and Distributed Algorithms
- Created, assigned, and graded homeworks. Mostly programming assignments.

Talks

Computational & Applied Mathematics Seminar, RIT

Fall Workshop on Computational Geometry, 2011

MAA Seaway Section Meeting, 2009, Rochester NY

AMS-MAA Joint Meeting 2009, Washington DC

Undergraduate Research Symposium, 2009, RIT College of Science

Posters

Multicore Homology Computer Science Research Symposium, Dartmouth, 2011

Topological Image Segmentation SIAM Annual Meeting, 2009 *(First Place)*

Work Experience

Givens Associate: Argonne National Laboratory, (June 2012 – August 2012)

- Implemented numerical algorithms for solving coupled multi-physics simulations for IBM BG/P BlueGene systems with 16k+ processors.
- Maintaining and optimizing the C++ Mesh Oriented Database Library.

Teaching Assistant: Discrete Mathematics (COSC 19), Winter 2010

- Held office hours regularly
- Graded homework and exams
- Answered emails and maintained the course message board

Research Intern, Advanced Document Imaging, (May 2010 - August 2010)

- Investigated novel algorithms for Natural Language Processing
- Rapidly implemented tools in C# and Python

Applications Specialist, Research Computing at RIT (November 2007 – May 2010)

- Recruited over one hundred researchers to use Research Computing Resources.
- Assisted over one hundred researchers in using various research systems.
- Assisted researchers in using applications (Matlab, ENVI/IDL, C++, etc.)
- Assisted researchers in benchmarking applications.

Research Intern, National Geospatial-Intelligence Agency, DoD (Summer 2007)

- Developed tools to improve image/geospatial analysis.
- Clearances Held: Top Secret + Sensitive Compartmented Information

Mathematics Tutor, Dutchess Community College, John Jay High School, briefly Rochester Institute of Technology (Fall 2002 - Fall 2007)

- Tutored Calculus and below

Conferences Attended

AMS-MAA Joint Meeting: Special Session on Computational Topology, 2012

UIUC Summer School on Multicore Programming, 2011

AMS-MAA Joint Meeting: Short Course on Computational Topology, 2011

First National Forum of Young Topologists, Tulane, 2009

NSF/CBMS Regional Conference: Algebraic Topology in Applied Mathematics, 2009 *Speaker: Prof. Rob Ghrist UPenn*

Conference on Mathematical Methods in Counter-terrorism, RIT, 2008

LANGUAGES C, C++, Python, Java, MATLAB, HTML, PHP, JavaScript, AJAX, C#/Mono, OpenMP

ACTIVITIES Organizer Theory Reading Group, Dartmouth College.

Software Maintainer Fedora GNU/Linux Project

President SIAM Chapter, Rochester Institute of Technology

Eagle Scout (Three Palms) Troop 25, B.S.A, Poughkeepsie, N.Y.

Vigil Honor The Order of the Arrow, Hudson Valley Council, BSA N.Y.