

Katrina Ray
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Curriculum Vitae
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Education

September 2004 – Present. University of Oregon. Eugene, OR.
Ph.D. Candidate in Computer Science. GPA: 4.0.
Projected completion date: June 2008.

September 2002 – June 2004. New Mexico State University. Las Cruces, NM.
M.S. in Computer Science. GPA: 4.0
Degree completed June 2004.

August 1998 – May 2002. Harvey Mudd College. Claremont, CA
B.S. in Computer Science / Math. GPA: 3.22, Major GPA: 3.48
Degree completed May 2002.

Employment

Teaching Experience

August 2003 – July 2004. New Mexico State University. Las Cruces, NM.
Teaching assistant for Discrete Math and graduate level Algorithms. Supervisor: Desh Ranjan.

February 2003 – May 2003. Private tutor for algorithms and combinatorics classes at New Mexico State University.

August 1999 – August 2002. Harvey Mudd College. Claremont, CA.
Grader/Tutor for Principles of Computer Science, Theory of Computation, and Algorithms courses. Supervisors: Ran Libeskind-Hadas, Zach Dodds, and Robert Keller.

August 2001 – December 2001. Pomona Presbyterian Church. Volunteer teacher for an after school program for at risk children in the local area.

Research Experience

August 2004 – Present. Computational Intelligence Research Lab (CIRL). Eugene, OR.
Research Assistant. Research in complexity theory, algorithms, and nonmonotonic reasoning.
Supervisors: Matt Ginsberg and David Etherington.

August 2002 – July 2004. New Mexico State University. Las Cruces, NM.
Research Assistant. Research in graph theory and game theory. Supervisor: Desh Ranjan.

June 2002 – Aug 2002. Harvey Mudd College. Claremont, CA.
Research Assistant. Research in parallel computing and space complexity. Supervisor: Melissa O'Neill.

June 2001 – Aug 2001. Harvey Mudd College. Claremont, CA.
Research Assistant. Research in optical networking. Supervisor: Ran Libeskind-Hadas.

Other Work Experience

December 2002 – January 2003. National Onion Inc. Las Cruces, NM.
Network Administrator. Managed small office network for a small company.

June 2001 – Aug 2001. Claremont McKenna College. Claremont, CA.
Web Developer. Helped to create the website for the American Jazz Institute:
www.amjazzin.com.

June 2000 - August 2000. Alcatel Internetworking Division, Calabasas, CA.
Summer Intern. Software testing for a program to monitor networks.

Publications

Algorithm Capability and Applications. Journal paper. To be submitted.
K. Ray and M. Ginsberg. 2008.

A New Method for Solving SAT Planning Problems. Conference paper. To be submitted.
K. Ray and M. Ginsberg. 2008.

Optimal Virtual Topologies for One-To-Many Communication in WDM Paths and Rings.
IEEE/ACM Transactions on Networking, 2003.
J.R. Hartline, R. Libeskind-Hadas, K. Dresner, E. Drucker, and K. Ray.

Multicast Virtual Topologies in WDM Paths and Rings with Splitting Loss. *International Conference on Computer Communications and Networking*, 2002.
J.R. Hartline, R. Libeskind-Hadas, K. Dresner, E. Drucker, and K. Ray.

Research Projects

September 2004 – Present. Doctoral research. Algorithms are applied to problems besides the one they were intended to solve by transforming the input and output. To be worthwhile, the transformations must be efficient so there are limitations on the scope of an algorithm. I formally define algorithm capability and prove the capability of the DPLL algorithm for Satisfiability. I show how this is useful by characterizing the subset of nonmonotonic reasoning and of SAT planning problems that can be solved with DPLL since the complexity of these problems is beyond NP. Advisor: Matthew Ginsberg.

April 2006 – October 2006. Bioinformatics project. Worked with one student. Scientists use evolutionary models to create hypothetical trees illustrating how evolution occurred. Ancestral reconstruction involves determining the most likely phylogenetic sequences for the internal nodes using known sequences for the leaf nodes. We created a tool that automates the ancestral reconstruction process and stores the relevant information in a database. Advisor: John Connery, Brian Kolaczowski, Joe Thornton.

Sept 2003 – June 2004. Masters thesis. Sprague-Grundy theory is a method of analyzing games by assigning a value to each position. If the value is zero, the current player is losing. I applied this theory to various games on graphs to calculate optimal strategies. I also demonstrated the complexity of a few games in order to show why it is hard to determine the value of a position in general, but can be done for some families of graphs. Advisor: Desh Ranjan.

Sept 2002 – June 2003. Research assistantship. I wrote a lexical analyzer generator that reads an input file of regular expressions and produces Unicon code implementing the finite automata to accept all strings generated by the regular expressions. Unicon is a programming language written by the project advisor. Advisor: Clinton Jefferey.

June 2002 – Aug 2002. Summer research. One processor can steal work from another when it has none left. Most work-stealing schedules sacrifice portability for space efficiency by changing calling conventions. We developed a set of rules for a portable work-stealing parallel scheduler. We proved a bound on the memory required to show that the scheduler is space efficient. Advisor: Melissa O'Neill.

Sept 2001 – May 2002. Mathematics Clinic Project in coordination with Northrop Grumman Electronic Systems Division. Worked with four other students. The noise in the output signal of satellites increases as a function of temperature. The temperature gradually rises, but jumps dramatically when the thermal cooling system breaks. We modeled the noise in the signal as a function of temperature and implemented the model in Visual C++, enabling the user to extract the signal from noisy data. Advisor: Henry Krieger.

June 2001 – Aug 2001. Summer research. Worked with three other students. Using wavelength division multiplexing allows us to send messages using a number of different wavelengths on a single optical channel. We can use the wavelength as the routing information so that an intermediate node can forward messages without having to convert back and forth between the electronic and optical domains to read the routing information. The goal of this project was to determine the optimal routing for a given network topology to minimize the number of conversions. Advisor: Ran Libeskind-Hadas.

Hobbies and Interests

I competed in track/field for 13 years and was a three-time All American. I like to stay active and currently play on an ultimate frisbee team and a soccer team. I also enjoy being involved in the community through volunteer work. I currently volunteer with Big Brothers Big Sisters and Greenhill Humane Society. In the past, I had the opportunity to take a service project trip to Costa Rica. I have also been a volunteer coach for KidSports. I have two very energetic dogs who make sure that I never get bored. Outside of my current research, I have a keen interest in cryptography.