Shoshana (Neuburger) Marcus

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Education

Ph.D.in Computer Science, Graduate Center, CUNY, 2012.

    Dissertation Advisor: Professor Dina Sokol

    Dissertation Title: 2D Dictionary Matching in Small Space

M. Phil in Computer Science, Graduate Center, CUNY, 2010 (GPA: 3.99).

M.A. in Applied Mathematics, Queens College, CUNY, 2006 (GPA: 3.67).

B.S. in Computer Science, Touro College, 2004 (GPA: 3.97).

    Honors: Summa Cum Laude, Computer Science Award.

Research

Postdoctoral Research

Developing new models and recommendations for genome sequencing. Simulating the sequencing and assembly of several dozen model genomes using current and emerging third generation sequencing technologies to map out how well we can expect those genomes to assemble. Developing and deploying new methods for assessing repeat content and assembly quality of genomes. Enhancing the Iplant Discovery Environment with additional state of the art assembly algorithms. Explored the execution model by launching assemblies of large genomes on large systems at TACC and on Blacklight at PSC. Supervised by Dr. Michael Schatz, Assistant Professor of Quantitative Biology, Cold Spring Harbor Laboratory.

Dissertation Research

Developed efficient algorithms and data structures for succinct dictionary matching in one and two dimensions. Although results have been achieved for one-dimensional data, our work is the first to address efficient two-dimensional dictionary matching in a space-constrained environment. We introduced new data structures and labeling schemes to achieve linear time complexity. Advised by Dr. Dina Sokol, Associate Professor, Brooklyn College, CUNY.

Undergraduate Research - CRA DMP

Computing Research Association Distributed Mentor Program, Summer 2003.
Merited to be one of 35 undergaduate students chosen nationwide to participate in the summer research project sponsored by the Computing Research Association, funded by the NSF. As a member of a research team, generated and executed empirical, statistical tests on the shuffled nested Weyl generator under the auspices of Professor Paula Whitlock, Brooklyn College, CUNY.

Grants and Fellowships

Sponsored Dissertation Fellowship (success rate $\approx$ 12%), "Small-Space Dictionary Matching", Graduate Center of CUNY, Sept 2011–June 2012 $18,000.

Adjunct Professional Development Grant, PSC-CUNY, January 2011. $1,000.

Doctoral Student Research Grant, Graduate Center of CUNY, 2011, $1,850.

Adjunct Professional Development Grant, PSC-CUNY, June 2010, $,1300.

Adjunct Professional Development Grant, PSC-CUNY, January 2010, $350.

NSF Computing Research Association - Distributed Mentor Project, Summer 2003, $6,000.

Honors and Awards

Graduate Teaching Fellow, The Graduate Center of CUNY, 2008–2011.

Enhanced Chancellor's Fellow, The Graduate Center of CUNY, 2007–2012.

Computer Science Award, Touro College, 2004.

Dean's List, Touro College, 2001–2004.

Merit Scholarship, Touro College, 2001–2004.

Teaching Experience

Brooklyn College, CUNY, Department of Computer and Information Science

Adjunct Instructor, Spring 2007–Fall 2011.

CORC 1312 Computing: Nature, Power and Limits

CISC 2531 Operations Management

CISC 3110 Advanced Programming Techniques

CISC 3150 Object-Oriented Programming

Touro College, Department of Computer Science

Adjunct Instructor, Fall 2009–Fall 2010.

MCO 140 Computer Concepts With Applications

Touro College, Department of Mathematics

Mathematics Tutor, 2003–2005.

Publications

S. Neuburger and D. Sokol. Succinct 2D Dictionary Matching. *Algorithmica*, March 2013, Volume 65, Issue 3, pp 662-684.

S. Marcus and D. Sokol. 2D Lyndon Words and Applications. submitted to *Algorithmica*, 2013.

S. Neuburger and D. Sokol. Small-Space 2D Compressed Dictionary Matching. *Combinatorial Pattern Matching Conference (CPM)*, 2010.

S. Neuburger and D. Sokol. Succinct 2D Dictionary Matching With No Slowdown. *Algorithms and Data Structures Symposium (WADS)*, 2011.

S. Marcus and D. Sokol. On 2D Lyndon Words. accepted to *String Processing and Information Retrieval Symposium (SPIRE)*, 2013.

S. Marcus and D. Sokol. Dynamic 2D Dictionary Matching in Small Space. submitted to *Meeting on Analytic Algorithmics and Combinatorics (ANALCO)*, 2014.

S. Neuburger. The Burrows-Wheeler Transform: Data Compression, Suffix Arrays, and Pattern Matching. *ACM SIGACT News*, 41(1), 21–24, 2010.

S. Marcus and D. Sokol. Engineering Small Space Dictionary Matching. CorR abs/1301.6428, 2013.

Invited Presentations

The Computational Challenges in Genome Assembly, Brooklyn College, CUNY, Brooklyn, NY, March 2013.

2D Lyndon Words and Applications, Polytechnic University, Brooklyn, NY, Feb. 2013.

Dictionary Matching in Small Space, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, May 2012.

Small-Space Dictionary Matching Software, Columbia University, New York City, NY, May 2012.

Succinct 2D Dictionary Matching, Polytechnic University, Brooklyn, NY, Dec. 2011.

Succinct 2D Dictionary Matching, Iona College, New Rochelle, NY, Nov. 2011.

Presentations

Succinct 2D Dictionary Matching WIth No Slowdown, Students Algorithm Research Workshop (STAR-W), Graduate Center of CUNY, Feb. 2012.

Succinct 2D Dictionary Matching With No Slowdown, Algorithms and Data Structures Symposium 2011, Aug. 2011.

Small-Space 2D Compressed Dictionary Matching, Symposium on Combinatorial Pattern Matching 2010, June 2010.

Small-Space 2D Compressed Dictionary Matching, 5th Israel Stringology Workshop, May 2010.

Succinct 2D Dictionary Matching, Students Algorithm Research Workshop (STAR-W), Graduate Center of CUNY, Feb. 2011.

Pattern Matching Algorithms: An Overview, qualifying exam, Graduate Center of CUNY, Sept. 2009.

Graduate School in Computer Science, Touro College student chapter of the ACM, May 2007.

Professional Activities

Referee for Theoretical Computer Science journal.

Conference Reviews for International Symposium on String Processing and Information Retrieval (SPIRE) 2011.

Conference Reviews for Symposium on Combinatorial Pattern Matching (CPM) 2010.

Taught CORC 1312 within a Learning Community, Brooklyn College, Fall 2010.

Served on an external advisory committee to evaluate undergraduate computer science program at College of Staten Island, CUNY, 2009.

Vice President, Touro College student chapter of the ACM, 2002–2004.

Conferences and Workshops Attended

Algorithms and Data Structures Symposium (WADS) 2011, Brooklyn, NY, Aug 15–17 2011.

SIAM Symposium On Discrete Algorithms (SODA) 2011, San Francisco, California, Jan 23–25 2011.

Combinatorial Pattern Matching (CPM) 2010, Brooklyn, NY, June 21–23 2010.

SIAM Symposium On Discrete Algorithms (SODA) 2010, Austin, Texas, Jan 17-19 2010.

5th Israel Stringology Workshop, Tel Aviv, Israel, May 2–6 2010.

4th Israel Stringology Workshop, Ramat Gan, Israel, March 29–April 2 2009.