

Shay Mozes - CV

Research Interests

Theoretical computer science. Specifically, the design and analysis of algorithms, graph theory and graph algorithms, planar graphs, data structures, approximation algorithms, dynamic programming, quantum computation.

Education

- 2007-present Ph.D. candidate in Computer Science, Brown University. Advisor: Prof. Philip Klein. Expected graduation spring 2012.
- 2002-2004 M.Sc. in Physics (Quantum Information Theory), Tel Aviv University. Advisor: Prof. Benni Reznik.
- 1999-2002 B.Sc. *Summa cum Laude* in Computer Science and Physics, *Amirim* honors program, The Hebrew University, Jerusalem.

Research Experience

- 10/2006-9/2007: MIT/BCS Gabrieli Lab. Part time consulting and programming in Matlab. Applied and implemented computational and statistical techniques to handle large scale fMRI data.
- 10/2002-09/2004: Tel-Aviv University. Research Assistant in the School of Mathematics and Computer Science. Designed, implemented and analyzed simulations in C++, python and Matlab, as part of an ongoing research. Experience with computational linear algebra and combinatorial optimization.
- 08/2000-11/2000: InSyst LTD, Jerusalem. R&D summer job in the field of online control of semiconductor wafers production (Clustering algorithms). Conducted technology surveys, adaptation of algorithms and feasibility tests in C++ and python in Windows environment. Participated in the design process of the next generation of the company's software product.

Teaching Experience

- MIT - Co-teaching 6.889: *Algorithms for planar graphs and beyond*, a graduate class on exact and approximation algorithms for optimization problems in planar graphs, surface embeddable graphs and graphs excluding a fixed minor. The class is supervised by Prof. Erik Demaine. I am delivering one third of the lectures. Classes are available online at <http://courses.csail.mit.edu/6.889/fall11>.
- Brown University - Delivered 7 guest lectures in a graduate-level class on algorithms in planar graphs (spring 2011). Developed labs, composed problem sets and solutions as a teaching assistant in the undergraduate classes *The Matrix in Computer Science* (fall 2008, fall 2009), a basic linear algebra class that combines rigorous proofs and hands on labs, and *Introduction to Algorithms and Data Structures* (spring 2010).
- Tel-Aviv University (2002-2004) - Delivered recitation classes as a teaching assistant for undergraduate classes *C for physicists* and *numerical methods for physicists*.

Honors and Awards

- Kanellakis fellowship (summer 2011)
- ESA 2010 best student paper award
- Kanellakis fellowship (summer 2010)
- CPM 2007 best paper award
- Ann and Maurice Cohen award - awarded to best incoming graduate students at Tel-Aviv University, 2003
- Summa Cum Laude graduation honors from the Hebrew University in Jerusalem
- Dean's list, Faculty of Science at The Hebrew University in Jerusalem (2000-2001)
- Dean's list, Faculty of Science at The Hebrew University in Jerusalem (1999-2000)
- *Amirim* honors program for B.Sc. in exact sciences (Hebrew University in Jerusalem)

Publications

Ph.D. Thesis

1. "Efficient Algorithms for Shortest Paths and Flow Problems in Planar Graphs". In preparation. Will include materials from publications 3, 4, 5, 7, 15.

Refereed conference publications

2. "Submatrix Maximum Queries in Monge Matrices and Monge Partial Matrices, and Their Applications", Haim Kaplan, Shay Mozes, Yahav Nussbaum and Micha Sharir. In *proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2012)*, to appear.
3. "Exact Distance Oracles for Planar Graphs", Shay Mozes and Christian Sommer. In *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2012)*, to appear. <http://arxiv.org/abs/1011.5549>
4. "Multiple-Source Multiple-Sink Maximum Flow in Directed Planar Graphs in Near-Linear Time", Glencora Borradaile, Philip N. Klein, Shay Mozes, Yahav Nussbaum and Christian Wulff-Nilsen. In *Proceedings of the 52nd Annual Symposium on Foundations of Computer Science (FOCS 2011)*, pages 170-179.
5. "Multiple-Source Single-Sink Maximum Flow in Directed Planar Graphs in $O(\text{diameter} \cdot n \log n)$ Time", Philip Klein and Shay Mozes. In *Proceedings of the 12th Algorithms and Data Structures Symposium (WADS 2011)*, pages 571-582.
6. "The Train Delivery Problem - Vehicle Routing Meets Bin Packing", Aparna Das, Claire Mathieu and Shay Mozes. In *Proceedings of the 8th Workshop on Approximation and Online Algorithms (WAOA 2010)*, pages 94-105.
7. "Shortest Paths in Planar Graphs with Real Lengths in $O(n \log^2 n / \log \log n)$ Time", Shay Mozes and Christian Wulff-Nilsen. In *Proceedings of the 18th Annual European Symposium on Algorithms (ESA 2010)*, pages 206-217.
Recipient of the **ESA 2010 best student paper award**.
8. "Efficient Algorithms for Analyzing Segmental Duplications, Deletions, and Inversions in Genomes", Crystal Kahn, Shay Mozes and Ben Raphael. In *Proceedings of the 9th International Workshop (WABI 2009)*, pages 169-180.

9. “Shortest Paths in Directed Planar Graphs with Negative Lengths: a Linear-Space $O(n \log^2 n)$ -Time Algorithm”, Philip Klein, Shay Mozes and Oren Weimann. In *Proceedings of the 20th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2009)*, pages 236-245.
10. “Fast Algorithms for Computing Tree LCS”, Shay Mozes, Dekel Tsur, Oren Weimann and Michal Ziv-Ukelson. In *Proceedings of the 19th Annual Symposium on Combinatorial Pattern Matching (CPM 2008)*, pages 230-243.
11. “Finding an Optimal Tree Searching Strategy in Linear Time”, Shay Mozes, Krzysztof Onak and Oren Weimann. In *Proceedings of the 19th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2008)*, pages 1096-1105.
12. “Speeding Up HMM Decoding and Training by Exploiting Sequence Repetitions”, Shay Mozes, Oren Weimann and Michal Ziv-Ukelson. In *Proceedings of the 18th Annual Symposium on Combinatorial Pattern Matching (CPM 2007)*, pages 4-15.
Recipient of the **CPM 2007 best paper award**
13. “An Optimal Decomposition Algorithm for Tree Edit Distance”, Erik Demaine, Shay Mozes, Benjamin Rossman, Oren Weimann. In *Proceedings of the 34th International Colloquium on Automata, Languages and Programming (ICALP 2007)*, pages 146-157.

Journal articles

14. “Efficient Algorithms for Analyzing Segmental Duplications with Deletions and Inversions in Genomes”, Crystal Kahn, Shay Mozes and Ben Raphael. *Algorithms for Molecular Biology* 2010, 5:11.
15. “Shortest Paths in Directed Planar Graphs with Negative Lengths: a Linear-Space $O(n \log^2 n)$ -Time Algorithm”, Philip Klein, Shay Mozes and Oren Weimann. Invited submission to *ACM Transactions on Algorithms special issue for SODA 2009 (TALG)* Vol. 6 (2) (2010).
16. “Fast algorithms for computing tree LCS”, Shay Mozes, Dekel Tsur, Oren Weimann and Michal Ziv-Ukelson. *Theoretical Computer Science*, 410 (43): 4303-4314 (2009).
17. “An Optimal Decomposition Algorithm for Tree Edit Distance”, Erik Demaine, Shay Mozes, Benjamin Rossman, Oren Weimann. *ACM Transactions on Algorithms (TALG)*, Vol. 6 (1) (2009).
18. “Speeding Up HMM Decoding and Training by Exploiting Sequence Repetitions”, Yury Lifshits, Shay Mozes, Oren Weimann and Michal Ziv-Ukelson. *Algorithmica* Vol. 54 (3) (2009), Page 379.
19. “A new construction for a QMA complete 3-local Hamiltonian”, Daniel Nagaj and Shay Mozes. *J. Math. Phys.* 48, 072104 (2007).
20. “Deterministic Dense Coding with Partially Entangled states”, Shay Mozes, Jonathan Oppenheim and Benni Reznik. *Phys. Rev. A.* 71, 012311 (2005).
21. “The Effect of Unitary Noise on Grover’s Quantum Search Algorithm”, Daniel Shapira, Shay Mozes and Ofer Biham. *Phys. Rev. A.* 67, 042301 (2003).

Professional Services

- External reviewer for CPM 2011, STACS 2011, FOCS 2010, ICALP 2010, SODA 2010, FOCS 2009, ICALP 2008, ACM Transactions on Algorithm, Algorithmica, Information Processing Letters, Quantum Information and Computation.
- Technical assistance to the PC chair of SODA 2009.
- Organizer of the theory lunch seminar series at Brown (2009)
- Assistance to the organizing team of FOCS 2007.