Justin Ward

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Current Position

2015–pres. Collaborateur Scientifique, Theory of Computation Laboratory, École
Polytechnique Fédérale de Lausanne

Research Interests

Combinatorial optimization
Approximation algorithms
Submodular maximization
Local search algorithms

Education

2012 Ph.D. Computer Science, University of Toronto
Specialization: Theory of Computing
Thesis: Oblivious and Non-Oblivious Local Search for Combinatorial
Optimization
Supervisor: Allan Borodin

2007 M.Sc. Computer Science, University of Toronto
Specialization: Software Engineering
Thesis: A Unified Model of Algorithm Design
Supervisor: Eric C.R. Hehner

2005 B.Sc. Computer Science, with Distinction, University of Kansas
B.A. English, with Distinction, University of Kansas

Previous Appointments

2012–2015 Research Fellow, Centre for Discrete Mathematics and its Applications,
Department of Computer Science, University of Warwick

Publications & Talks

Submitted and Working Papers

Maxim Sviridenko, Jan Vondrák, Justin Ward. "Optimal approximation for
submodular and supermodular optimization with bounded curvature."
Submitted to Mathematics of Operations Research.
http://arxiv.org/abs/1311.4728

Journal Articles

2016   Marek Adamczyk, Maxim Sviridenko, and Justin Ward. "Submodular Stochastic Probing on Matroids." Mathematics of Operations Research. 41-3 (2016), pp. 1022-1038.

Justin Ward and Stanislav Živný. "Maximizing k-Submodular Functions and Beyond." To appear in ACM Transactions on Algorithms.

2014   Yuval Filmus and Justin Ward. "A tight combinatorial algorithm for submodular maximization subject to a matroid constraint." SIAM Journal on Computing 43-2 (2014), pp. 514-542.

Peer-Reviewed Conference Proceedings

2016   Rafael Barbosa, Alina Ene, Huy L Nguyen, Justin Ward. "A New Framework for Distributed Submodular Maximization." To appear in *FOCS '16: Proceedings of the 57th IEEE Symposium on Foundations of Computer Science* http://arxiv.org/abs/1507.03719

Konstantin Makarychev, Yury Makarychev, Maxim Sviridenko, Justin Ward. "A bi-criteria approximation algorithm for k-Means." To appear in *APPROX '16: Proceedings of the 19th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems*. http://arxiv.org/abs/1507.04227

2015   Rafael Barbosa, Alina Ene, Huy L Nguyen, Justin Ward. "The Power of Randomization: Distributed Submodular Maximization on Massive Datasets." In *ICML '15: Proceedings of the 32nd International Conference on Machine Learning*, pp. 1236-1244.

Maxim Sviridenko, Jan Vondrák, Justin Ward. "Optimal approximation for submodular and supermodular optimization with bounded curvature." In *SODA '15: Proceedings of the 25th ACM-SIAM Symposium on Discrete Algorithms*, pp. 1134-1148.

2014   Marek Adamczyk, Maxim Sviridenko, Justin Ward. "Submodular Stochastic Probing on Matroids." In *STACS '14: 29th International Symposium on Theoretical Aspects of Computer Science*. pp. 29-40.

Justin Ward and Stanislav Živný. "Maximizing Bisubmodular and k-Submodular Functions." In *SODA '14: Proceedings of the 24th ACM-SIAM Symposium on Discrete Algorithms*, pp. 1468-1481.

2013   Maxim Sviridenko and Justin Ward. "Large Neighborhood Local Search for the Maximum Set Packing Problem." In *ICALP '13: 40th International Colloquium on Automata Languages and Programming*, pp. 792-803.

2012   Yuval Filmus and Justin Ward. "A tight combinatorial algorithm for submodular maximization subject to a matroid constraint." In *FOCS '12: Proceedings of the 53rd IEEE Symposium on Foundations of Computer Science*, pp. 659-668.

Yuval Filmus and Justin Ward. "The Power of Local Search: Maximum Coverage over a Matroid." In *STACS '12: 29th International Symposium on Theoretical Aspects of Computer Science*, pp. 601-612.

2012   Justin Ward. "A $(k+3)/2$-Approximation Algorithm for Monotone Submodular k-set Packing and General k-Exchange Systems." In *STACS '12: 29th International Symposium on Theoretical Aspects of Computer Science*, pp. 42-53.

2011   Moran Feldman, Joseph (Seffi) Naor, Roy Schwartz, and Justin Ward. "Improved Approximations for k-Exchange Systems." In *ESA '11: Proceedings of the 19th European Symposium on Algorithms*, pp. 784-798.

2005   Justin Ward, Garrin Kimmell, and Perry Alexander. "Prufrock: A Framework for Constructing Polytypic Theorem Provers." In *ASE '05: Proceedings of the 20th IEEE/ACM International Conference on Automated Software Engineering*, pp. 423-426.

Invited Talks

2016   "Improved Approximation for K-Means in Arbitrary Dimension." 8th Workshop on Flexible Network Design. Amsterdam, Netherlands. 5 July 2016.

2015   "A Distributed Greedy Algorithm for Submodular Maximization in Large Datasets." Invited talk at Yahoo! Labs, New York. 15 January 2015.

2014   "Approximating k-Set Packing with Local Search on Large Neighborhoods." Workshop on Frontiers and Connections between Parametrization and Approximation. Bertinoro, Italy. 29 May 2014.

          "Iterative Rounding Algorithms for Stochastic Probing Problems." University of Edinburgh LFCS Seminar. 13 May 2014.

          "Large Neighborhood Local Search for k-Set Packing Problems." University of Liverpool Computer Science Departmental Seminar Series. 4 February 2014.

2013   "Maximizing Bisubmodular and k-Submodular Functions." Oxford University Algorithms Seminar. 12 November 2013.

          "Maximizing Bisubmodular and k-Submodular Functions." Durham University Algorithms and Complexity Seminar. 30 October 2013.

          "Local Search Algorithms for Set Packing Problems." University of Leicester Computer Science Seminar. 11 October 2013.

          "Maximizing Bisubmodular and k-Submodular Functions." 4th Cargèse Workshop on Combinatorial Optimization. 1 October 2013.

          "From Submodular to k-Submodular Maximization." 6th Workshop on Flexible Network Design. Fields Institute, Toronto, Canada. 31 July 2013.

2013   "Local Search Algorithms for k-Set Packing Problems." Invited talk at Google Research Manhattan. 26 July 2013.

          "Local Search Algorithms for k-Set Packing Problems." University of Warwick DIMAP Retreat. 25 March 2013.

          "Non-oblivious local search and submodular maximization." Invited Speaker at QMUL and Warwick DIMAP PhD Workshop. 6 March 2013.

2012   "Improved Approximations for Monotone Submodular k-Set Packing and General k-Exchange Systems." DIMAP Seminar at University of Warwick. 6 March 2012.

2012   "Improved Approximations for Monotone Submodular k-Set Packing and General k-Exchange Systems." Invited Seminar at Laboratoire d'Informatique Algorithmique. 27 February 2012.

2011   "Linear and Monotone Submodular Optimization in k-Exchange Systems." 4th Eastern Great Lakes Theory of Computation Workshop. 10 September 2011.

Grants, Honors & Awards

2011   Doctoral Completion Award, University of Toronto
              ($10,000 plus tuition for final year of doctoral study)

2007-2011   University of Toronto Fellowship (Ph.D.)

2005-2007   University of Toronto Fellowship (M.Sc.)

2005   Ilus W. Davis Writing Award, Department of English, University of Kansas

Teaching Experience

Modules Taught

2014   Dept. of Computer Science, University of Warwick
              Algorithmic Graph Theory, Spring 2014.

2009   Dept. of Computer Science, University of Toronto
              Principles of Programming Languages, Summer 2009.

Teaching Assistantships

2005-2012   Dept. of Computer Science, University of Toronto
              Introduction to Programming (Fall 2005).
              Mathematical Expression and Reasoning for Computer Science (Winter 2006).
              The Why and How of Computing (Fall 2007).
              Principles of Programming Languages (Fall 2006, Winter 2007, Fall 2007, Winter 2008, Summer 2008, Fall 2008, Winter 2009, Winter 2010).
              Introduction to the Theory of Computation (Fall 2010).
              Algorithm Design and Analysis (Summer 2010, Winter 2011).
              Algorithm Design, Analysis and Theory (Spring 2012).

Guest Lectures

2015   School of Computer and Communication Sciences, EPFL
              Algorithms (Fall 2015 – 2 weeks)

2013-2014   Dept. of Computer Science, University of Warwick
              Algorithmic Graph Theory (Spring 2013 – 3 weeks)

Service to the Profession

2016   Program Committee, 43rd International Colloquium on Automata Languages and Programming (ICALP 2016), Track A.

Academic Service

2013-2014   Department Postdoc Representative, Computer Science Department, University of Warwick

References

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Ola Svensson
Tenure Track Assistant Professor
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