Ashok Rajaraman

CONTACT INFORMATION	1206 West Gregory Drive, Room 109 UIUC, Urbana, Illinois 61801	*Phone:* +1 (217) 417-9746 *E-mail:* arajaram@illinois.edu, ashok.rajaraman@gmail.com *Website:* http://web.engr.illinois.edu/~arajaram/

EDUCATION

Simon Fraser University, Burnaby, B.C., Canada

Doctor of Philosophy in Mathematics **2015**

- Senior Supervisor: Cédric Chauve.
- Thesis: *Variants of the Consecutive Ones Property: Algorithms, Computational Complexity and Applications in Genomics.*

Master of Science in Mathematics **2011**

- Thesis: *Inference of Ancestral Protein-Protein Interactions using Methods from Algebraic Statistics.*

Indian Institute of Technology Roorkee, Uttarakhand, India

Bachelor of Technology in Metallurgical and Materials Engineering **2009**

- Major Project: *Synthesis and Characterization of ZnO Thin Films.*

EXPERIENCE

Postdoctoral Research Associate **May 2015 - Ongoing**
Department of Bioengineering, University of Illinois at Urbana-Champaign, Illinois

Research Assistant **September 2011 - August 2012**
Simon Fraser University, Burnaby, British Columbia, Canada

Research Assistant **January 2010 - August 2011**
Simon Fraser University, Burnaby, British Columbia, Canada

Marker for First and Second Year Calculus **May 2014 - August 2014**
Simon Fraser University, Burnaby, British Columbia, Canada

Teaching Assistant for First and Second Year Calculus **January 2014 - April 2014**
Simon Fraser University, Burnaby, British Columbia, Canada

Intern **May 2008 - August 2008**
DRDO, Delhi, India

RESEARCH

Algorithms and complexity
- *Consecutive Ones Problems with Multiplicity*
  Study of tractability results for consecutive ones problems with multiplicity assigned to the matrix columns. Focus on complexity, parameterized complexity and development of new techniques to approach optimization problems.
- *Algorithms for vertex ordering in hypergraphs*
  Development of approximation algorithms for vertex ordering problems in hypergraphs. In particular, interested in applications to optimization problems arising from evolutionary biology, motivated by connections to the consecutive ones property.

Computational biology

- *Ancestral genome scaffolding*
  Reconstruction of ancestral genomes and chromosomes taking advantage of classical concepts related to the linearization of combinatorial structures, such as the travelling salesman, flow network optimization, consecutive ones in binary matrices, or interval graphs and sandwich problems, and using data from extant species.
- *Mathematical models for genome mapping*
  Modelling genome mapping problems as variants of the consecutive ones property. Development of software for mapping ancestral genomes using said techniques.

PUBLICATIONS

- Rajaraman, A., Chauve, C., and Ponty, Y. Assessing the robustness of parsimonious predictions for gene neighborhoods from reconciled phylogenies. In *Bioinformatics Research and Applications - 11th International Symposium, ISBRA 2015, Norfolk, VA, USA, June 7-10, 2015 Proceedings*, pages 260–271. 2015. doi:10.1007/978-3-319-19048-8_22.

- Rajaraman, A., Zanetti, J.P.P., Maňuch, J., and Chauve, C. Algorithms and complexity results for genome mapping problems, 2015. Submitted to IEEE TCBB.

- Chauve, C., Patterson, M., and Rajaraman, A. Hypergraph covering problems motivated by genome assembly questions. In *Combinatorial Algorithms - 24th International Workshop, IWOCA 2013, Rouen, France, July 10-12, 2013, Revised Selected Papers*, pages 428–432. 2013. doi:10.1007/978-3-642-45278-9_37.

- Rajaraman, A., Tannier, E., and Chauve, C. FPSAC: Fast Phylogenetic Scaffolding of Ancient Contigs. *Bioinformatics*, 29(23):2987–2994, 2013. doi:10.1093/bioinformatics/btt527.

- Rajaraman, A., Tannier, E., and Chauve, C. The genome of the medieval Black Death agent. In *JOBIM*. 2013. Accepted.

- Jones, B.R., Rajaraman, A., Tannier, E., and Chauve, C. ANGES: Reconstructing ANcestral GEnomeS maps. *Bioinformatics*, 2012. doi:10.1093/bioinformatics/bts457.

TALKS AND POSTERS

Centre for Systems Genomics, Pennsylvania State University　　　　**October 2014**

- Talk: *A simple scaffolding pipeline, with application to ancient genomes*

Research in Computational Molecular Biology (RECOMB)　　　　**April 2014**

- Poster: *Algorithms and complexity results for genome mapping problems*

PIMS IGTC in Mathematical Biology Summit　　　　**November 2013**

- Poster: *Scaffolding the genome of the Black Death agent*
- Talk: *Scaffolding the genome of the Black Death agent*

Models and Algorithms for Genome Evolution　　　　**August 2013**

- Poster: *Scaffolding the genome of the Black Death agent*
- Poster: *Hypergraph covering problems motivated by genome assembly*

ACM Symposium on the Theory of Computing　　　　**June 2013**

- Poster: *Hypergraph covering problems motivated by genome assembly*

PIMS Young Researchers Conference　　　　**May 2011**

- Talk: *Parametric inference of ancestral protein interaction networks*

WORKSHOPS	**Enumeration Algorithms and Exact Methods for Exponential Problems in Computational Biology**	September 2012

- *School on exact exponential time algorithms*

	IPAM Mathematical and Computational Approaches in High-Throughput Genomics	November 2011

- *Workshop on evolutionary genomics*

ACADEMIC HONOURS

Michael Stevenson Graduate Scholarship
- Awarded the Michael Stevenson Graduate Scholarship, valued at $ 30,000 for the 2014-2014 academic period.

SFU President's PhD Scholarship
- Awarded the SFU President's PhD Scholarship, valued at $ 6,250 for Spring 2014 term.

PIMS International Graduate Training Centre Fellowship in Mathematical Biology
- Awarded the Pacific Institute of Mathematical Sciences IGTC fellowship in Mathematical Biology, valued at $ 10,000 per annum, for the period 2012-2014.

Faculty of Science Graduate Fellowships
- Awarded the Faculty of Science Graduate Fellowship for the Summer 2010, 2012, 2013 and 2014 terms.

Travel and Minor Research Award
- Awarded the Graduate Travel and Minor Research Award for the Fall 2011 and Fall 2012 terms, to attend workshops in Los Angeles and Bertinoro respectively.

ACADEMIC SERVICE

RECOMB-CG 2011
- Reviewed for RECOMB-CG 2011, whose proceedings were published in the BMC Bioinformatics journal (Volume 12, Supplement 9).

COMPUTER SKILLS

Languages
Python (primary), C++, Perl, bash, HTML.

Platforms & Tools
LaTeX, numpy/scipy, MATLAB, polymake.

Operating Systems and Interfaces
–IX systems, Windows, OS X.

REFERENCES

Dr. Cedric Chauve
Senior Supervisor
Department of Mathematics
Simon Fraser University
cedric.chauve@sfu.ca

Dr. Eric Tannier
Collaborator
INRIA Beagle Team
Université de Lyon 1
Eric.Tannier@inria.fr

Dr. Bojan Mohar
Supervisory Committee Member
Department of Mathematics
Simon Fraser University
bojan_mohar@sfu.ca