

Keki M. Burjorjee

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Qualifications: Firm foundation in computer science and mathematics. Strong analytical, critical-thinking, and communication skills. Innovative. Experienced in using evolutionary computation for optimization.

EDUCATION

Brandeis University, Waltham, MA 2002--2009

- Ph.D. in Computer Science

Dissertation title – Generative Fixation: A Unified Explanation for the Adaptive Capacity of Simple Recombinative Genetic Algorithms

Advisor: Jordan B. Pollack, Dynamic and Evolutionary Machine Organization (DEMO) Lab

- M.A in Computer Science May 2004

Coursework in: Information Theory, Artificial Intelligence, Operating Systems, and Distributed Systems

University of Rochester, Rochester, NY 2000--2002

- Graduate Student, Brain and Cognitive Sciences (BCS) Department

Coursework in: Neuroscience, Artificial Intelligence, Electrical Engineering, and Computational Complexity

Vassar College, Poughkeepsie, NY: 1994--1998

- A.B. (Honors, GPA 3.95/4.00)
 - Majors: Computer Science (Honors, GPA 3.97/4.00), Mathematics (Honors, GPA 4.00/4.00)
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SOFTWARE DEVELOPMENT EXPERIENCE

Oracle Corporation, Redwood Shores, CA

Senior Applications Engineer 1999 – 2000

Applications Engineer 1998 – 1999

- *XML Marshaller*: Implemented a rudimentary object to relational mapping layer for transferring data between transient business objects and persistent XML files. Used Oracle's in-house BC4J (Business Components for Java), XML Parser, XSLT Processor and JServer tools. Provided feedback to the BC4J development team.
 - *Business Policy Framework*: Invented a language for coding business policies. Wrote an interpreter for this language in Java.
 - *Role Based Security Framework*: Implemented a security framework for the Internet Product Development module of Oracle's B2B Exchange Server. Used Java and Java Server Pages.
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RESEARCH EXPERIENCE

DEMO Lab, Computer Science Department, Brandeis University, Waltham, MA Fall 2002 – Present

- Solved a hard theoretical problem in the field of evolutionary computation by finding non-trivial conditions under which the dynamics of simple genetic algorithms with infinite populations can be coarse-grained.
- Discovered that the simple genetic algorithm can implement a powerful non-local search heuristic called *Hyperclimbing* extraordinarily efficiently.
- Developed and submitted the *Generative Fixation Hypothesis*, a new explanation for the remarkable, yet mysterious adaptive capacity of simple genetic algorithms.

Undergraduate Research Summer Institute, Vassar College, NY: Researcher Summer 1996

Implemented a load balancing algorithm in C/C++ to make a high accuracy volume renderer run efficiently on a multi-node IBM SP2 supercomputer. Used the message passing interface (MPI) for inter-node communication.

PROGRAMMING SKILLS

- Java, C/C++, Matlab
 - XML, XSLT, Java Server Pages
 - Significant experience with object oriented programming and design
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AWARDS & PRIZES

- Tiny GA Competition Winner, Genetic and Evolutionary Computation Conference (2006)
 - Recipient, Sproull Fellowship for unusually strong potential for graduate study, University of Rochester (2000)
 - Recipient, Mary Evelyn Wells and Gertrude Smith Prize for excellence in the study of undergraduate mathematics, Vassar College (1998)
 - Part of a team of three that placed second in a national high school programming competition (Computer Society of India, 1992)
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INTERNSHIPS & SUMMER SCHOOLS

- Complex Systems Summer School**, Santa Fe Institute, NM *Summer 2002*
Attended lectures on complex systems, co-wrote and presented a survey of the literature on developmental encodings in evolutionary computation.
- Pretzel Logic Software Inc.**, Cupertino, CA: Programming Intern *Summer 1997*
Designed and developed an installer and configuration manager in Java for a complex client-server application.
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PUBLICATIONS & MANUSCRIPTS

- Burjorjee K. M.** (2009) "Generative Fixation: A Unified Explanation for the Adaptive Capacity of Simple Recombinative Genetic Algorithms ", Ph.D. Thesis, Brandeis University
- Burjorjee K. M.** "The Fundamental Problem with the Building Block Hypothesis", under review at the *Evolutionary Computation Journal* (submitted April 7, 2009)
- Burjorjee K. M.** (2007) "Towards a Sound Theory of Adaptation for the Simple Genetic Algorithm ", Technical Report
- Burjorjee K. M.** (2007) "Sufficient Conditions for Coarse-Graining Evolutionary Dynamics", *Proceedings of the Ninth Foundations of Genetic Algorithms Conference (FOGA IX)*
- Burjorjee K. M.**, Pollack, J.B. (2006) "A General Coarse-Graining Framework for Studying Simultaneous Inter-Population Constraints Induced by Evolutionary Operations", *Proceedings of the 2006 Genetic and Evolutionary Computation Conference*
- Burjorjee K. M.**, Pollack, J. B. (2005) "Theme Preservation and the Evolution of Representation", *Proceedings of the 2nd Indian International Conference on Artificial Intelligence*
- Burjorjee K. M.**, Pollack, J. B. (2005) "Theme Preservation and the Evolution of Representation", Theory of Representation Workshop, *Genetic and Evolutionary Computation Conference 2005*
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ACADEMIC SERVICE

Reviewer, IEEE Transactions on Evolutionary Computation

TEACHING EXPERIENCE & ASSISTANTSHIPS

Computer Science Department, Brandeis University, Waltham, MA

- Fundamentals of Operating Systems, TA: Graded coursework *Spring 2006*
- Discrete Mathematics, TA: Graded coursework, taught classes *Fall 2005*
- Introduction to Theory of Computation, TA: Graded coursework *Spring 2003*
- Cryptography, TA: Graded coursework *Fall 2002*

Brain and Cognitive Sciences Department, University of Rochester, NY

- Neuropsychology, TA: Lead Recitation, helped prepare midterm and final exams *Fall 2001*

Computer Science Department, Vassar College, NY

- Head Coach: Instructed departmental coaches on tutoring CS students *Fall 1995 – Spring 1996*
 - Coach: Tutored beginning CS students *Spring 1994 – Spring 1995*
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Keywords: genetic algorithms, evolutionary computation, optimization, machine learning, artificial intelligence, complex systems, theoretical computer science, probability theory, statistics.