Rahul T. Shah

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Objective

Full-time research position in design, analysis and implementation of algorithms and applications.

Research Interests

Design and Analysis of Algorithms, Data Structures, Algorithms on Metric Spaces, Combinatorics and Graph Theory. Applications of algorithms to various fields. Implementation of Algorithms

Education

- **Doctor of Philosophy (Computer Science)** **November 2001**
  Rutgers University, NJ
- **Master of Science (Computer Science)** **December 1998**
  Rutgers University, NJ 4.0/4.0
- **Bachelor of Technology (CS&E)** **April 1997**
  Indian Institute of Technology, Bombay. Rank 4/36

Publications

- R. Shah, Martin Farach-Colton, *On the Midpath Tree Conjecture – A Counter-Example*, SODA 2001
- R. Shah, Martin Farach-Colton, *On the Complexity of Ordinal Clustering*, Under Preparation.
- R. Shah, R Jain, et al, *Efficient Dissemination of Personalized Information Using Content-Based Multicast*,To appear in InfoCom 2002
- R. Shah, S. Langerman, S. Lodha, *Algorithms for Efficient Filtering in Content-Based Multicast*, Proceedings of ESA 2001, Winner of Best Student Paper award.
- R. Shah, Martin Farach-Colton, *Undiscretized Dynamic Programming: Faster Algorithms for Facility Location and Related Problems on Trees*, SODA 2002.

Research Experience

- **Spring ’99 to Date, Doctoral Thesis**
  Advisor: Dr. Martin Farach-Colton
  Topic : Undiscretized Dynamic Programming and Ordinal Embeddings
  Worked on Problems in Facility location on trees, covering problems on trees, multicast filtering, phylogeny construction and hierarchical ordinal clustering. Developed a method which improves the running time of many dynamic programming algorithms, particularly on trees.
- **7/96 – 4/97, Senior Thesis**
  Advisor: Dr. A. A. Diwan , CS&E, IIT Bombay
  Topic : Enumerating Independent Sets in Trees and Chordal Graphs.
  Worked on lots of combinatorial enumeration problems. In particular solved the 'Gray code' enumeration problems for maximum independent sets in trees, fixed size independent sets in proper interval graphs and fixed sized independent sets in well covered trees.
- **Spring ’96, Junior Thesis**
  Advisors: Dr. Ketan Mulmuley, U. of Chicago & Dr. Sundar Vishwanathan , IIT Bombay
  Topic : Rapidly Mixing Markov Chains.
  Studied mathematical properties of Markov Chains and their application in approximating permanent of 0/1 matrix and volume of convex body.

Work Experience

- **Summer ’00, Summer Intern, Telcordia Technologies**
  Worked on optimal and heuristic algorithms for placing mobile filters in the content-based multicast tree . Designed a series of faster algorithms for optimally placing filters in the

multicast tree.

- **Summer 98, Summer Intern, Bell Core.**
  Worked on approximation/heuristic algorithms for survivable network design. Implementation of some of these was done in C. In particular, worked on Ring loading Problem and Shortest pair of disjoint paths problem.
- **Fall '97 –date, Teaching Assistant, Rutgers University**
  Teaching assistant for various courses like Design and Analysis of Data Structures and Algorithms (I & II), Discrete Structures, Network and Combinatorial Optimization, Theory of Computation, Operating Systems
- **Summer '96, Summer Intern, Tata Unisys Ltd.**
  Worked on a part of Video-on-Demand Project on platform MS-WINDOWS. The programming was done in Microsoft Visual C++.

Academic Honors

- Winner of Best Student Paper Award at European Symposium on Algorithms (ESA) 2001.
- Institute Academic Award Winner ,IIT Bombay ,in academic years 93-94 and 94-95 for excellent academic performance.
- Secured All India 9th Rank at IIT Joint Entrance Examination, 1993, amongst approximately 1,00,000 students all over the country, who took the exam.
- Awarded the National Talent Search (NTS) scholarship, instituted by the National Council for Educational Research and Training (NCERT),New Delhi, India. (1991). Each year about 750 awards are made, countrywide.

Programming Skills

- Programming Languages – C, JAVA, SML, PASCAL, FORTRAN, COBOL, LISP, PROLOG, ADA, C++, MATLAB, SQL, VHDL
- Operating Systems – DOS, UNIX, Solaris, MS Windows.
- Assembly Languages – 8085, 8086, SPARC

Programming Projects

- **Information Retrieval**
  Implemented a Mini Web Search Engine for pages at www.cs.rutgers.edu using TFIDF and similarity based locality heuristic for ranking the documents. The implementation was done using C/perl/cgi.
- **Data Structures and Algorithms**
  Efficient algorithm for shortest pair of disjoint paths problem for survivable network design.
  Comparison of Branch and Bound (exact) algorithm and heuristic (approx.) algorithm for Traveling Salesman Problem in Pascal.
- **Operating Systems Theory**
  Implementation of Web Proxy Server with caching and blocking in C.
  Study and Documentation of Linux kernel code for Buffer Cache.
- **Pattern Recognition**
  Extraction of Blood vessels from Retinal Images. The program for automatic extraction of the vascular tree from retinal fluorescein angiograms was written in Matlab.
- **Compilers**
  Constructed a compiler for subset of Pascal using C,Lex and YACC.
  DCG parser generator in PROLOG.
- **Database Systems**
  Implemented one part of mini database system developed at IIT Bombay. It involved the implementation of hybrid hash join algorithm (in C).
  Designed a query interface for Project Management System at IIT Bombay (in SQL).

Relevant Coursework (Theory)

- D&A of DS and algos I & II
- Applied Graph Theory
- Theory of Computation
- Geometric Algorithms
- Linear Programming
- Approximation Algorithms
- Operations Research
- Combinatorics I & II

Relevant Coursework (Systems)	• Operating Systems • Programming Languages and Compilers • Artificial Intelligence • Information Retrieval	• Computer Architecture • Database Systems • Computer Graphics • Pattern Recognition

References	• Prof. Martin Farach-Colton	martin@google.com	(650) 318 0200 x 1156
	• Prof. Michael Fredman	fredman@cs.rutgers.edu	(732) 445 3626
	• Prof. Vasek Chvatal	chvatal@cs.rutgers.edu	(732) 445 3908