

Suresh Venkatasubramanian

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RESEARCH INTERESTS: Design and analysis of algorithms; computational geometry and graphics; algorithmic statistics; massive data sets; computational biology and chemistry.

- EDUCATION:
- ◇ **Stanford University** Stanford, California.
Ph.D in Computer Science (1994-1999).
Thesis: Geometric Shape Matching and Drug Design.
Advisors: Prof. Rajeev Motwani and Prof. Jean-Claude Latombe.

 - ◇ **Stanford University** Stanford, California.
M.S in Computer Science, January 1998.

 - ◇ **Indian Institute of Technology**, Kanpur, INDIA.
B.Tech. in Computer Science and Engineering (1990-1994). GPA: 4.0/4.0.
Advisor: Prof. Somenath Biswas.
- WORK EXPERIENCE:
- ◇ **School of Computing**, University of Utah.
John E. and Marva M. Warnock Assistant Professor, January 2007-present
 - ◇ **Computer and Information Sciences**, University of Pennsylvania.
Adjunct Assistant Professor, October 2002-present.
 - ◇ **AT&T Labs**, Florham Park, New Jersey.
Senior Member, Technical Staff. October 1999 – 2007.
 - ◇ **AT&T Labs**, Florham Park, New Jersey.
Summer intern, Jun-Sep 1998.
Worked on the design and analysis of external memory graph algorithms, as well as implementing and conducting empirical performance studies on these algorithms.
 - ◇ **DIMACS**, Rutgers University, New Jersey.
Visitor, February 1998.
Visited DIMACS as part of the Special Year on Massive Data Sets.
 - ◇ **Compaq SRC**, Palo Alto, California.
Summer intern, Jun-Sep 1997.
Designed and implemented a *Connectivity Server* for the processing of neighborhood queries on the Web.
 - ◇ **Stanford University**, Stanford, California.
Research Assistant, 1994 – 1999.

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TEACHING
EXPERIENCE

University of Utah

Spring 2007 CP SC 5962/7962: Computational Geometry.

Fall 2007 CS 5150/6150: Graduate Algorithms

Fall 2007 CS 7936: Approximate High Dimensional Data Analysis

University of Pennsylvania

Spring 2003 CIS 677: Computational Geometry and Applications (co-taught with Sudipto Guha)

Spring 2005 CIS 700/010: GPU Programming and Architecture

HONORS AND
AWARDS

- John E. and Marva M. Warnock Presidential Endowed Chair for Faculty Innovation in Computer Science, 2007.
- School of Engineering Fellowship, Stanford University, 1994-1995.
- Senate Award for Academic Excellence, I.I.T Kanpur.
- Academic Proficiency Award, I.I.T. Kanpur, all years. [1990-94].

GRANTS

- **CCF-0602527**: Workshop on Computational Geometry and Visualization (\$7000) (Joseph S. B. Mitchell, co-PI). Nov 1, 2005–Oct 31, 2006.

PAPERS

◇ **Submitted.**

- Validating Multi-column Schema Matching by Type (with B. T. Dai, N. Koudas D. Srivastava and A. Tung).
- Approximate Symmetry Detection for 3D Shapes with Guaranteed Error Bounds (with Shankar Krishnan)
- On measures of privacy (book chapter; invited)

◇ **Patents.**

- The Connectivity Server (with A. Broder, M. Burrows, M. Henzinger, S. Ghemawat and P. Kumar). U.S. Patent 6,073,135
- Hardware-assisted View Dependent Map Simplification (with N. Mustafa and S. Krishnan). U.S. Patent 6,812,925.
- **(Provisional)** Rectangular Layouts of Planar Graphs (with A. Buchsbaum, E. Gansner and C. M. Procopiu)

◇ **Publications.**

- Directed Graphs and Rectangular Layouts (with A. Buchsbaum and E. Gansner). In *Asia-Pacific Symposium on Visualization*, Feb 2007.
- t -closeness: Privacy beyond k -anonymity and ℓ -diversity (with N. Li and T. Li). In *Proc. 23rd Intl. Conf. Data. Engg (ICDE)*, Apr 2007.
- Restricted Strip Packing And The Sensor Cover Problem (with A. Buchsbaum, A. Efrat, S. Jain and K. Yi). In *18th ACM-SIAM Symposium on Discrete Algorithms*, Jan 2007.
- Rapid Detection of Column Heterogeneity (with B. T. Dai, N. Koudas, B. C. Ooi and D. Srivastava). In *IEEE International Conference on Data Mining*, Dec 2006.
- Curve Matching, Time Warping and Light Fields (with A. Efrat and Q. Fan). In *Journal of Mathematical Imaging and Vision*.

- Rectangular Layouts of Planar Graphs (with A. Buchsbaum, E. Gansner and C. M. Procopiuc). *ACM Transactions on Algorithms*, under review.
- Statistical Data Depth And The Graphics Hardware (with N. Mustafa and S. Krishnan). In *Data Depth: Robust Multivariate Analysis, Computational Geometry and Applications*, ed. Liu, Serfling and Souvaine, pp. 223–246. AMS, 2006.
- Spatial Scan Statistics: Approximations and Performance Study (with D. Agarwal, A. McGregor, J. Phillips and Z. Zhu). In *12th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*, Aug 2006.
- An Information-Theoretic Approach to Detecting Changes in Multi-dimensional Data Streams (with P. Dasu, S. Krishnan and K. Yi). In *INTERFACES*, May 2006.
- Streaming and Sublinear Approximation of Entropy and Information Distances (with S. Guha and A. McGregor). In *17th ACM-SIAM Symposium on Discrete Algorithms*, January 2006.
- Hunting of the Bump: On Maximizing Statistical Discrepancy (with D. Agarwal and J. Phillips). In *17th ACM-SIAM Symposium on Discrete Algorithms*, January 2006.
- Global Registration of Multiple 3D Point Sets via Optimization-on-a-Manifold (with S. Krishnan, P.-Y. Lee, and J. Moore). In *3rd Eurographics Symposium on Geometry Processing*. Jul 2005.
- On stationarity in Internet measurements through an information-theoretic lens (with B. Krishnamurthy and H. Madhyasthe). In *NetDB 2005: 1st IEEE Workshop on Networking and Databases*, Apr 2005.
- Hardware-based Natural Neighbour Interpolation (with A. Efrat, Q. Fan, V. Koltun and S. Krishnan). In *7th Workshop on Algorithms Engineering and Experimentation (ALENEX)*, Jan 2005.
- vLOD: A System for High Fidelity Walkthroughs of Large Virtual Environments (with J. Chhugani, B. Purnomo, S. Krishnan, J. Cohen, D. S. Johnson and S. Kumar). In *IEEE Transactions on Visualization and Computer Graphics*, **11(1)**, 2004.
- Compressing Large Boolean Matrices Using Reordering Techniques (with D. S. Johnson, S. Krishnan, J. Chhugani and S. Kumar). In *30th International Conference on Very Large Databases*, August 2004.
- Pattern Matching for Sets of Segments (with A. Efrat and P. Indyk) *Algorithmica*, 2004.
- Streaming Geometric Optimization using Graphics Hardware (with P. Agarwal, S. Krishnan and N. Mustafa). In *11th European Symposium on Algorithms*, Sep 2003.
- Application of the Two-Sided Depth Test to CSG Rendering (with S. Guha, S. Krishnan and K. Munagala). In *2003 ACM Siggraph Symposium on Interactive 3D Graphics*, Apr 2003.
- The Graphics Card as a Stream Computer. In *SIGMOD Workshop on Management and Processing of Massive Data*, June 2003.
- Combinatorial and Experimental Methods for Approximate Point Pattern Matching (with M. Gavrilov, P. Indyk and R. Motwani). In *Algorithmica: Special Issue on Shape Matching*, **38(1)**, 2003.
- Dynamic Simplification and Visualization of Large Maps (with S. Krishnan, N. Mustafa and G. Varadhan). To appear in *International Journal of Geographic Information Systems: Special Issue on Map Generalization*.

- Hardware-assisted algorithms for Depth contours (with N. Mustafa and S. Krishnan). In *13th ACM-SIAM Symposium on Discrete Algorithms*, January 2002.
- Hardware-Assisted View Dependent Map Simplification (with N. Mustafa, E. Koutsofios and S. Krishnan). In *17th ACM Symposium on Computational Geometry*, June 2001.
- Pattern Matching with Sets of Segments (with A. Efrat and P. Indyk). In the *12th ACM-SIAM Symposium on Discrete Algorithms*, January 2001.
- On the Decidability of Accessibility (with R. Motwani, R. Panigrahy and V. Saraswat). In *32nd ACM Symposium on the Theory of Computing*, May 2000.
- On External Memory Graph Traversal (with A. Buchsbaum, M. Goldwasser and J. Westbrook). In *11th ACM-SIAM Symposium on Discrete Algorithms*, January 2000.
- Approximate Congruence in Nearly Linear Time (with P. Indyk). In *11th ACM-SIAM Symposium on Discrete Algorithms*, January 2000.
Invited to special issue of *Intl. Journal of Computational Geometry and Applications*.
- A Theory Repository on the Web: A Proposal. To appear in *SIGACT NEWS* **30(4)**, pp. 91-95, December 1999.
- Geometric Pattern Matching: A Performance Study (with M. Gavrilov, P. Indyk, and R. Motwani). In *15th ACM Symposium on Computational Geometry*, June 1999.
- Geometric Pattern Matching under noise; Combinatorial bounds and Algorithms (with P. Indyk, and R. Motwani). In the *10th ACM-SIAM Symposium on Discrete Algorithms*, January 1999.
- Proximity search in databases. (with H. Garcia-Molina, R. Goldman, and N. Shivakumar). In *24th Conference on Very Large Databases (VLDB'98)*, August 1998.
- The Connectivity Server: Fast Access to Linkage Information on the Web. (with K. Bharat, A. Broder, M. Henzinger, and P. Kumar). In *Seventh International World Wide Web Conference*, April 1998.
- Storage management for evolving databases (with J. Kleinberg, R. Motwani and P. Raghavan). In *38th IEEE Symposium on Foundations of Computer Science*, October 1997.
- Search Techniques for Rational Drug Design. (with P. W. Finn, L. E. Kavradi, J. C. Latombe and R. Motwani). In *Proc. IASTED International Conference on Intelligent Information Systems 1997 (IIS'97)*, December 8-10, 1997, Grand Bahama Island, The Bahamas.
- RAPID: Randomized Pharmacophore Identification in Drug Design. (with P. Finn, L. Kavradi, R. Motwani, J-C. Latombe, C. Shelton, and A. Yao). In *Proc. 13th Symposium on Computational Geometry*, June 1997.
Invited to special issue of *Computational Geometry: Theory and Applications*, **10**, 1998, pp. 262–272.
- Geometric Manipulation of Flexible Ligands. *Proc. Workshop on Applied Computational Geometry*, May 1996. (with D. Halperin, J-C. Latombe, L. Kavradi, R. Motwani, and C. Shelton.)
Applied Computational Geometry: Towards Geometric Engineering, Eds. M. C. Lin and D. Manocha. Lec. Notes. Comp. Sci. **1148**, 1996, pp. 67–78.

- Energy Efficient Indexing for Information Dissemination in Wireless Systems. In *ACM-Baltzer Journal of Mobile Networks and Nomadic Applications (NOMAD)* **1** pp. 433-446 (1996) (with N. Shivakumar).

PRESENTATIONS

◇ **Tutorials**

- Data Visualization and Mining Using The GPU. *11th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2005*. (with S. Guha and S. Krishnan)

◇ **Talks**

- Rapid Identification of Column Heterogeneity
 - Yahoo! Research [10/2006]
 - Computer and Information Sciences Department, University of Pennsylvania [3/2006]
- Histograms, Information Distances And Nonparametric Inference
 - Indian Institute of Science, Bangalore [6/2007]
 - MSRI Workshop on Mathematics of Visual Analysis [10/2006]
- Hunting of the Bump: On Maximizing Statistical Discrepancy
 - 3rd International Workshop on Applied Probability, Storrs, CT [5/2006]
 - Lucent Math Seminar [2/2006]
 - AT&T Math Seminar [11/2005]
- Data Visualization and Mining on the GPU
 - IBM Research, NY [5/2006].
 - University of Toronto [9/2005].
- Algorithms For Information Distances.
 - EPFL, Lausanne [7/2005].
 - Workshop on Sublinear Algorithms, Dagstuhl. [7/2005]
- Compressing Large Boolean Matrices Using Reordering Techniques
 - 30th VLDB 2004 [8/2004].
- Streaming Algorithms in Graphics Hardware
 - Lucent Bell Labs [3/2003]
 - DIMACS Streaming Working Group [3/2003]
 - AT&T Database Seminar [4/2003]
 - SIGMOD-DIMACS Workshop on Management and Processing of Data Streams [6/2003]
 - University of Chicago [11/2003]
 - University of Michigan [10/2004]
 - Florida State University [3/2005]
- Streaming Geometric Optimization Using Graphics Hardware
 - DIMACS Workshop on Geometric Optimization [5/2003]
 - 11th European Symposium on Algorithms [9/2003]
- Visualizing Data Depth with Graphics Hardware
 - DIMACS Workshop on Data Depth [5/2003]
 - 13th ACM-SIAM Symposium on Discrete Algorithms [1/2002]
- Rectangular Layouts and Contact Graphs

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- Lucent/AT&T Labs Math Seminar, Florham Park, NJ. [4/2002]
- Department of Computer Science and Information Sciences, University of Pennsylvania. [3/2003]
- Digital Geometry Processing in Hardware.
 - Stanford Geometry Seminar [1/2002]
 - AT&T Labs, Menlo Park [1/2002].
 - Department of Computer and Information Science, University of Pennsylvania. [2/2002].
 - Department of Computer Science, Duke University [3/2002].
- Pattern Matching with Sets of Segments
 - 12th ACM-SIAM Symposium on Discrete Algorithms, Washington, DC. [1/2001]
- Hardware-assisted View Dependent Map Simplification
 - 10th Annual Fall Workshop on Computational Geometry, Stony Brook [10/2000]
- On the decidability of accessibility
 - Lucent/AT&T Labs Math Seminar, Florham Park, NJ. [4/2000]
- On External Memory Graph Traversal
 - 11th ACM-SIAM Symposium on Discrete Algorithms, San Francisco, CA. [1/2000].
 - Department of Computer Science, SUNY Stony Brook [2/2000].
- Approximate Congruence in Nearly Linear Time
 - 4th CGC Workshop on Computational Geometry, Baltimore, MD. [10/1999].
 - 11th ACM-SIAM Symposium on Discrete Algorithms, San Francisco, CA. [1/2000].
- Geometric Algorithms in Rational Drug Design.
 - Southern California Algorithms Seminar (USC) (4/00)
 - AT&T Shannon Laboratories (3/99)
 - Xerox PARC (4/99)
 - University of California, Irvine (2/99)
 - Medical Informatics Department, Stanford University (5/98).
 - AT&T Laboratories, New Jersey (2/98).
 - Indian Institute of Technology, Kanpur, India (9/97).
- Geometric Pattern Matching: A Performance Study.
 - 15th ACM Symposium on Computational Geometry, Miami, FL. [6/1999].
- RAPID: Randomized Pharmacophore Identification in Drug Design.
 - Workshop¹ on Pharmacophore Identification (in the 213th National Meeting of the American Chemical Society). [12/1997]
 - 13th Symposium on Computational Geometry, Nice, France. [6/1997]
 - 1st CGC Workshop on Computational Geometry, Baltimore, MD. [10/1996]
- Storage management for evolving databases.
 - 38th IEEE Symp. FOCS, Miami, FL. [10/1997]

¹Presented by Dr. P. W. Finn

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- Geometric Point Set Matching: Combinatorial Bounds and Algorithms.
 - 10th ACM-SIAM Symposium on Discrete Algorithms, Baltimore, MD. [1/1999].
 - 2nd CGC Workshop on Computational Geometry, Durham, NC. [10/1997].
- Geometric Manipulation of Flexible Ligands.
 - Workshop on Applied Computational Geometry. [5/1996]

SERVICE

◇ **Referee**

- The Visual Computer Journal
- IEEE Symposium on Foundations of Computer Science.
- ACM Symposium on Theory of Computation
- ACM-SIAM Symposium on Discrete Algorithms
- ACM Symposium on Computational Geometry
- European Symposium on Algorithms.
- ACM-SIGMOD-SIGART Symposium on Principles of Database Systems.
- Journal of the ACM.
- Journal of Algorithms.
- International Journal of Computational Geometry and Applications
- IEEE Transactions on Knowledge and Data Engineering
- Journal of Theoretical Biology

◇ **Committees:**

- 12th Annual Workshop on Computational Geometry, Nov 14-15, 2002 (co-sponsored by DIMACS).
- 16th ACM-SIAM Symposium on Discrete Algorithms, Jan 2005.
- 15th Annual Workshop on Computational Geometry, 2005 (chair).
- 14th European Symposium on Algorithms, Sep 2006.
- 12th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2006.
- 9th Workshop on Algorithms, Engineering and Experiments (ALENEX), 2007.
- 33rd International Conference on Very Large Databases (VLDB), 2007.
- 23rd ACM Symposium on Computational Geometry, 2007.
- 13th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2007.

REFERENCES

Available on request.