ABHIJIN ADIGA

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Current position: Postdoctoral Associate (since October 2011)
Network Dynamics and Simulation Science Laboratory
Virginia Bioinformatics Institute
Research Building XV (0477), 1880 Pratt Drive
Blacksburg, VA 24061, USA
(**Note:** Job description is provided at the end.)

RESEARCH INTERESTS

My research area is graph theory and algorithms, with focus on:

- Approximation and parameterized algorithms
- Graph dynamical systems and theoretical aspects of diffusion in complex networks
- Geometric representation of graphs: intersection graph representations and dimensional properties of graphs
- Algorithmic game theory

EDUCATION

PhD: (August 2006–March 2011)
Department of Computer Science and Automation,
Indian Institute of Science

Supervisor: Dr. L Sunil Chandran
Thesis: On dimensional parameters of graphs and posets
Thesis Research Topics: Geometric representation of graphs, dimensional properties of graphs and posets.

Master of Science (Engg): (August 2001 – August 2003)
Department of Electrical Engineering,
Indian Institute of Science,

Supervisor: Dr. K R Ramakrishnan
Research Areas: Signal Processing, Image Processing, and Filter Banks.
Thesis: "Cyclic Multirate Structures Based on Symmetric-Periodic Sequences."

Bachelor of Engineering: (1996 - 2000)
Bangalore University (B.M.S. College of Engineering)
Discipline: Telecommunication Engineering

WORK EXPERIENCE

- March 2011 – September 2011
  Research Associate, Dept. of Computer Science and Automation, IISc.
  Area: Graph theory
- August 2004 – July 2006
  Worked in **Beceem Communications Pvt Ltd**. I was involved in the design and implementation of algorithms for WiMax (802.16), a wireless communication standard.

- October 2003 – April 2004
  Project Associate: worked under Dr. P S Sastry, Dept. of EE, IISc.
  Area: Temporal Data-mining

- October 2000 – August 2001
  Project Associate: worked under Dr. K R Ramakrishnan, Dept. of EE, IISc.
  Areas: Joint Source and Channel Coding, Advanced Encryption Standard (Rijndael).

ACHIEVEMENTS IN ACADEMICS

- Infosys Fellow (since January 2007): A fellowship awarded to select PhD candidates in IISc by Infosys Technologies Ltd.
- Secured All India Rank of 34 in GATE 2000 (EC), a national level entrance exam for post graduate studies.
- Ranked 7th in Bangalore University in Telecommunication Engg. (Year 2000).

PUBLICATIONS

- **Lower bounds on boxicity**, A. Adiga, L. S. Chandran and N. Sivadasan, accepted in Combinatorica.
- **How robust is the core of a network?**, A. Adiga, A. Kumar S. Vullikanti, accepted in The European Conference on Machine Learning and Principles of Knowledge Discovery in Databases (ECML PKDD'13), Prague, September 2013.
- **Sensitivity of Diffusion Dynamics to Network Uncertainty**, A. Adiga, C. Kuhlman, H. S. Mortveit, A. Kumar S. Vullikanti, accepted in Proceedings of the Twenty-Seventh Conference on Artificial Intelligence (AAAI'13), Bellevue, July 2013.
- **Route Stability in Large-Scale Transportation Models**, A. Adiga, H. S. Mortveit, S. Wu, Workshop on Multiagent Interaction Networks, AAMAS 2013.
- **Cubicity, Degeneracy and Crossing Number**, A. Adiga, L. S. Chandran and R. Mathew, accepted in European J. Combin. (Also presented in FSTTCS 2011, 176-190).
- **Parametrized and Approximation Algorithms for Boxicity**, A. Adiga, J. Babu and L. S. Chandran, accepted in IPEC-2012.
- **Representing a cubic graph as the intersection graph of axis-parallel boxes in three dimensions**, A. Adiga and L. S. Chandran, accepted in Symposium on Computation Geometry (SoCG 2012).
- **Boxicity and poset dimension**, A. Adiga, D. Bhowmick and L. S. Chandran, accepted in SIAM Journal on Discrete Mathematics (also accepted in COCOON, Nha Trang, Vietnam, LNCS vol. 6196, 3-12, 2010).
- **A constant factor approximation algorithm for boxicity of circular arc graphs**, A. Adiga, J. Babu and L. S. Chandran, WADS, Brooklyn, USA, LNCS vol. 6844, 13-24, 2011.
- **Parameterized algorithms for boxicity**, A. Adiga, R. Chitnis and S. Saurabh, ISAAC, Jeju Island, Korea, LNCS vol. 6506, 366-377, 2010.
- **The hardness of approximating the threshold dimension, boxicity and cubicity of a graph**, A. Adiga, D. Bhowmick and L. S. Chandran, Discrete Applied Mathematics, vol. 158 (16), 2010, 1719-1726.
- **Cubicity of interval graphs and the claw number**, A. Adiga and L. S. Chandran, Journal of Graph Theory 65(4): 323-333, 2010 (also presented in EuroComb 2009, Bordeaux, France).

- **Cubicity of threshold graphs**, A. Adiga, Disc. Math., 309(8): 2535-2537, 2009.
- **A design and implementation of orthonormal symmetric wavelet transform using PRCC filter banks**, A. Adiga, K. R. Ramakrishnan and B. S. Adiga, ICASSP 2003, Hong Kong.

COMMUNITY ACTIVITIES

Reveiwed papers for Graphs and Combinatorics, Information Processing Letters and several conferences.

REFERENCES

Available on request.

1 Current job (since October 2011)

As a post doctoral associate my work involves mathematical modeling of complex graph dynamical systems which have diverse applications in computer science, biology and sociology. Along with others in the group, I focus on analysis and development of efficient algorithms for solving combinatorial problems that arise out of the study of such systems.

2 Research associate (March 2011 to October 2011)

I continued my PhD work.

3 PhD thesis abstract (August 2006 to March 2011)

The work of this thesis falls into the broad area of theoretical computer science, and in particular, concerns graph theory, combinatorics and algorithms. We study some geometric representations of graphs and dimensional properties of graphs and posets. The main objective is to represent a graph using certain geometric objects. Many problems on graphs which are otherwise computationally hard to solve can be solved efficiently if the graph in consideration has a simple geometric representation. In the parlance of theoretical computer science, many NP-hard problems may be either solved in polynomial time or at least have good approximation algorithms when a graph has a low dimensional geometric representation. Besides, the representations which we consider have applications in various other scientific disciplines: ecology, social sciences, psychology, telecommunication and operations research. Our contibution to this area are as follows: (1) We have developed efficient algorithms to obtain such representations for certain specific classes of graphs. (2) We have complexity results which show that for some classes of graphs, it is computationally hard to obtain such a representation. (3) We give a general framework relating different representations.

4 Beceem Communications Pvt. Ltd. (August 2004 – July 2006)

I was part of the algorithm development and simulation group. My work involved the design and implementation of algorithms for WiMax (802.16), a wireless broadband standard. I worked on (1) implementing and maintaining the error control coding module in the simulator, (2) The creation of an interface between the simulator (coded in MATLAB) and the chip (coded using Verilog), (3) Running simulations by varying parameters such as type of codec, channel, etc.

5 Work as project associate (October 2003 to April 2004)

The work was in the area of temporal data-mining. The aim was to extract interesting patterns from a sequence of logs obtained from a manufacturing process by using machine learning techniques. I helped in the development of the data mining tools for this purpose.

6 MSc thesis abstract (August 2001 to September 2003)

We proposed a framework for implementing wavelet transforms in the frequency domain particularly for application on images and analyzed the performance of our methods in the context of image compression by comparing our methods with the methods used in JPEG and JPEG 2000 image compression standards.

7 Work as project associate (October 2000 – August 2001)

I worked in the area of communication theory. My work involved studying the area of joint source and channel coding and other areas related to telecommunication. I implemented some algorithms like turbo codecs and Rijndael in MATLAB and helped in administrative activities.