Somnath Sikdar, Ph.D.

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Personal Information

- DATE OF BIRTH: 31st October 1977

- PLACE OF BIRTH: Kolkata (Calcutta), India

- NATIONALITY: Indian

Current Position

Postdoctoral researcher in the Theoretical Computer Science group at RWTH Aachen University, Aachen, Germany.

Key Achievements/Skills Set

- PhD in Theoretical Computer Science from the Institute of Mathematical Sciences, Chennai, India on graph optimization problems.

- Deep knowledge of efficient algorithms for graph optimization problems. Fundamental contributions for optimization problems on sparse graphs.

- Current research on probabilistic graph models of complex networks provides a groundbreaking insight into network structure.

- Ability to understand hard technical material along with creative and writing skills. Obtained funds for two major projects: *Theoretical and Practical Aspects of Kernelization*, funded by DFG; and *Kernels, Protrusions and Graph Minors* funded by DAAD and the Norwegian Science Foundation.

- Excellent managing, supervision, and teamwork skills. Envisioned and created the student team working on community detection algorithms for social networks at the Theoretical Computer Science group.

- Excellent communication and teaching skills. Consistently obtained top scores in teaching evaluations at the RWTH Aachen University.

Research Interests

My research focuses on designing algorithms for *graph optimization* problems. My main area of research is *fixed-parameter algorithms* which is devoted to designing efficient algorithms for computationally intractable problems that arise in industry and applications. The other algorithm design paradigms that I work with are *approximation* and *exact* algorithms. A recurrent topic in graph optimization problems is designing algorithms for otherwise intractable problems on classes of sparse graphs, since sparse graphs often provide sufficient structural footholds for designing efficient algorithms.

I interested in algorithmic problems that arise in the field of *complex networks* and, in particular, *social* and *biological networks*. I am interested in *probabilistic models* of complex networks. In addition to analyzing the structure of complex networks, I am work on problems such as *community detection* and *motif finding*. These problems typically involve large social or biological networks and require the design of scalable algorithms so that they can be implemented to work within reasonable time limits. One of the goals of this research is to bridge the gap between what is possible in theory and what works in practice. As such, we often resort to *algorithm engineering* tools to make our algorithms work in practice.

Academic Experience

- RWTH AACHEN UNIVERSITY, Aachen, Germany

  ◇ Post-doctoral researcher (October 2009 – present)

- THE INSTITUTE OF MATHEMATICAL SCIENCES, Chennai, India

  ◇ PhD student in Theoretical Computer Science (August 2003 – August 2009)
  ◇ Dissertation Topic: *Parameterizations from the extremes: Feasible parameterizations of some NP-optimization problems.*

Teaching and Other Activities

I am actively involved in teaching and the following is a representative list of courses I taught.

- Tutorials for *Parameterized Complexity*: this semester.

- Seminar course on *Complex Networks: Structural Aspects and Algorithms*: this semester.

- Tutorials for *The Analysis of Algorithms*: Summer Semester 2014.

- Seminar course on *Algorithms on Sparse Graphs*: Winter Semester 2013–2014.

- *Exact Algorithms* (along with Dr. Joachim Kneis): Winter Semester 2010–2011.

In addition, I successfully wrote two research grant proposals which were accepted by the DFG and DAAD, respectively.

Programming Skills

I program in Java and infrequently in C++. I am also learning Python for handling big data. Current projects:

- *overlapping community detection* for social networks;

- an application for *graph optimization* problems.

Code available at: `https://github.com/somnath1077`.

Language Skills

English (fluent), German (Basic A1).

Education

- THE INDIAN STATISTICAL INSTITUTE, Kolkata, India

  ◇ Master of Technology (First Division with Distinction), Computer Science (2001 – 2003)

- CALCUTTA UNIVERSITY, Kolkata, India

  ◇ Bachelor of Science and Technology (First Class), Textile Technology (1996 – 2000)

Professional Services

Peer-reviewed papers for the following journals (amongst others):

- SIAM Journal of Discrete Mathematics

- Theoretical Computer Science

- Algorithmica

- Journal of Discrete Algorithms

- Discrete Optimization

Personal Interests

- Sports and fitness

- Calligraphy, computer typesetting in LaTeX, collecting fountain pens

- Traveling

Some Recent Presentations

- *Linear Kernels Using Structural Parameters on Sparse Graph Classes.* At the 4th Workshop on Kernelization (WORKER 2013), University of Warsaw, Warsaw, Poland, April 2013.

- *Linear Kernels on Graphs Excluding Topological Minors.* Dagstuhl Workshop on Data Reduction and Problem Kernels, Schloss Dagstuhl, Germany, June 2012.

- *Lower Bounds on the Complexity of MSO_1 Model-Checking.* Symposium on Theoretical Aspects of Computer Science, University Pierre et Marie Curie, Paris, France, March 2012.

Publications

Please see the separate addendum on my list of publications. For more online information, see:

- `http://www.informatik.uni-trier.de/∼ley/pers/hd/s/Sikdar:Somnath.html`

- `https://www.researchgate.net/profile/Somnath_Sikdar`