

First ups and downs on the Academic Roller Coaster

BRICS Retreat 2011

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“Sparse Matrix Multiplication in the I/O Model”

- Research Group with 2 PhD students, 1.5 years left
(Emmy Noether Programm der DFG)
- Complexity Analysis:
 - Sparse Matrix \times Dense Vector
 - Sparse Matrix \times Dense Matrix
 - Parallel Models (mainly PEM: shared external memory)
 - Dependency on the conformation of the matrix
- Algorithm Engineering



Ideal: Relevant Theory

Topics

- Dynamic Planar Convex Hull
- Delay Management
- Shunting
- I/O and comparison based lower bounds

Typical Methods

- Asymptotic analysis
- NP-completeness
- Probabilistic method and counting
- Algorithmic techniques and tricks
- Algorithm Engineering

June '91 “Abitur” in Würzburg.

November '94 “Vordiplom” in computer science (physics).

April '95 “Vordiplom” in mathematics (computer science).

September '97 “Diplom” in computer science (minor mathematics) Würzburg. “Locational Decisions Focusing on Online Strategies” Sven O. Krumke. (combinatorial optimization, PSPACE-hardness)

May '97 – May '98 *Graduate Research Assistant at the Los Alamos National Laboratory*, in the Research Team of TRANSIMS (TRansportation ANalysis and SIMulation System). (Implementing Dijkstra, Formal Language Constrained Path Problems, SWAT '98)



- Started with Peter Bro Miltersen
- Ad-Placement (CCI-Europe, Gerth)
- Treewidth 2 Path Reduction (Tibor Jordan)
- Dynamic Planar Convex Hull (Gerth)
(SWAT '00, FOCS '02)
- Train Timetable Itineraries (Gerth)



April '02 – April '03 Database Group of Hans-Peter Kriegel at
LMU Munich
(Nearest Neighbor Search in High Dimensions)



“Algorithms, Data Structures, and Applications” Group of Peter Widmayer at ETH Zürich

- OVSF-Code Assignment (STACS '04)
Thomas Erlebach, Matus Mihalak, Marc Nunkesser, Gabor Szabo, and Peter
- Joint Base Station Scheduling (WAOA '04) (as above)
- Delay Management (optimization, online-problem)
(SWAT '04, WG '05, ATMOS '04)
Michael Gatto, Björn Glaus, Anita Schöbel, Leon Peeters, and Peter
- Freight Railway Optimization (optimization, OR) (WEA '05)
Marc Nunkesser and Michael Gatto



- Randomized Comparison Based Collision (MFCS '07)
- PepSplice (I/O, Bio) Franz F. Roos, J., Jonas Grossmann, Bernd Fischer, Joachim M. Buhmann, Wilhelm Gruissem, Sacha Baginsky, and Peter
- Sequential Vector Packing Mark Cieliebak, Alexander Hall, and Marc Nunkesser
- Shunting Trains Marc Nunkesser, Michael Gatto
- Sparse Matrix Multiplication in the I/O Model Michael Bender, Gerth Stolting Brodal, Rolf Fagerberg, and Elias Vicari



- Topologically Self Stabilizing Data Structures (PODC '09, ISAAC '09, LATIN '10) Andrea Richa, Stephan Ritscher, Christian Scheideler, Stefan Schmid, and Hanjo Täubig.
- Formalizing Things Tobias Nipkow, Jeremy Avigad, Amine Chaieb
- Sparse Grids Dirk Pflüger, Hans Bungartz, Philipp Hupp



So what?

Questions to ask

What is important to me?

Is the academic career right for me?

To be remembered

“Work and you will have results”

Directions and writing are difficult

Something good is going to come out of it eventually.

