First ups and downs on the Academic Roller Coaster

BRICS Retreat 2011

Riko Jacob

Lehrstuhl für Effiziente Algorithmen
Fakultät für Informatik
Technische Universität München

BRICS Retreat 2011
“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 × Dense Vector
  - Sparse Matrix × Dense Matrix
  - Parallel Models (mainly PEM: shared external memory)
  - Dependency on the conformation of the matrix

- Algorithm Engineering

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## 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).


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)
At BRICS (August ’98 – February ’02)

- 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)
Second PostDoc (May ’03 – May ’07)

“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
Additional Topics at TUM

- **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
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.