Suraj Kumar

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Interests

Matrix and tensor computations, Communication costs, Parallel algorithms

Professional Experience

- **Inria Lyon** — Lyon, France
  Junior Researcher — *Oct 2022 – present*
- **Inria Paris** — Paris, France
  Postdoctoral Researcher — *Nov 2019 – Sep 2022*
- **Pacific Northwest National Laboratory** — Richland, Washington, USA
  Postdoctoral Research Associate — *May 2018 – Oct 2019*
- **Ericsson Research** — Bangalore, India
  Senior Engineer — *Aug 2017 – Feb 2018*
- **IBM India Research Lab** — New Delhi, India
  Software Engineer — *Jul 2012 – Nov 2013*

Education

- **Inria Bordeaux, University of Bordeaux** — Bordeaux, France
  Doctorate of Philosophy — *Dec 2013 – Apr 2017*
- **Indian Institute of Science** — Bangalore, India
  Master of Engineering in Computer Science and Engineering — *Aug 2010 – Jun 2012*

Publications

The papers with * have author names in alphabetical order.

1. *Communication Lower Bounds and Optimal Algorithms for Symmetric Matrix Computations
   Hussam Al Daas, Grey Ballard, Laura Grigori, Suraj Kumar, Kathryn Rouse, Mathieu Verite
   (Available at https://arxiv.org/abs/2409.11304, submitted in Sept 2024)

2. *Communication Lower Bounds and Optimal Algorithms for Multiple Tensor-Times-Matrix Computation
   Hussam Al Daas, Grey Ballard, Laura Grigori, Suraj Kumar, Kathryn Rouse
   SIAM Journal on Matrix Analysis and Applications (*SIMAX*), 2024, 45(1).

3. *Parallel Memory-Independent Communication Bounds for SYRK
   Hussam Al Daas, Grey Ballard, Laura Grigori, Suraj Kumar, Kathryn Rouse
   ACM Symposium on Parallelism in Algorithms and Architectures (*SPAA 2023*), Jun 2023, Orlando, FL, USA.

4. *Parallel Tensor Train through Hierarchical Decomposition
   Laura Grigori, Suraj Kumar
   (Available at https://hal.inria.fr/hal-03081555, working paper).

5. *Brief Announcement: Tight Memory-Independent Parallel Matrix Multiplication Communication Lower Bounds
   Hussam Al Daas, Grey Ballard, Laura Grigori, Suraj Kumar, Kathryn Rouse
   ACM Symposium on Parallelism in Algorithms and Architectures (*SPAA 2022*), Jul 2022, Philadelphia, PA, USA.

6. NWChemEx – computational chemistry for the exascale era
   Karol Kowalski, Edoardo Aprà, Raymond Bair, Jeffery S. Boschen, Eric J. Bylaska, Jeff Daily, Wibe A. de Jong, Thom Dunning, Niranjan Govind, Robert J. Harrison, Kristopher Keipert, Sriram Krishnamoorthy, Suraj Kumar, Erdal Mutlu, Bruce Palmer, Ajay Panyala, Bo Peng, Ryan M. Richard, T. P. Straatsma, Edward F. Valeev, Marat Valiev, Hubertus J. J. van Dam, David B. Williams-Young, Chao Yang, Marcin Zalewski, Theresa L. Windus
   Chemical Reviews 2021, Volume 121(8), 4962-4998.

7. *Analysis of a List Scheduling Algorithm for Task Graphs on Two Types of Resources
   Lionel Eyraud-Dubois, Suraj Kumar
   IEEE International Parallel & Distributed Processing Symposium (*IPDPS 2020*), May 2020, New Orleans (Virtual), Louisiana, USA.

8. Performance Models for Data Transfers: A Case Study with Computational Chemistry Kernels
   Suraj Kumar, Lionel Eyraud-Dubois, Sriram Krishnamoorthy
   International Conference on Parallel Processing (*ICPP 2019*), Aug 2019, Kyoto, Japan.

9. *Fast Approximation Algorithms for Task-Based Runtime Systems
   Olivier Beaumont, Lionel Eyraud-Dubois, Suraj Kumar
   Concurrency and Computation: Practice and Experience (*CCPE*), Wiley, 2018, 30:e4502.

10. *Approximation Proofs of a Fast and Efficient List Scheduling Algorithm for Task-Based Runtime Systems on Multicores and GPUs
    Olivier Beaumont, Lionel Eyraud-Dubois, Suraj Kumar
    IEEE International Parallel & Distributed Processing Symposium (*IPDPS 2017*), May 2017, Orlando, Florida , USA.

11. *Scheduling of Linear Algebra Kernels on Multiple Heterogeneous Resources
    Olivier Beaumont, Terry Cojean, Lionel Eyraud-Dubois, Abdou Guermouche, Suraj Kumar
    International Conference on High Performance Computing, Data, and Analytics (*HiPC 2016*), Dec 2016, Hyderabad, India.

12. *Are Static Schedules so Bad? A Case Study on Cholesky Factorization
    Emmanuel Agullo, Olivier Beaumont, Lionel Eyraud-Dubois, Suraj Kumar
    IEEE International Parallel & Distributed Processing Symposium (*IPDPS 2016*), May 2016, Chicago, IL, USA. IEEE, 2016.

13. *Bridging the Gap between Performance and Bounds of Cholesky Factorization on Heterogeneous Platforms
    Emmanuel Agullo, Olivier Beaumont, Lionel Eyraud-Dubois, Julien Herrmann, Suraj Kumar, Loris Marchal, Samuel Thibault
    Heterogeneity in Computing Workshop (*HCW 2015*), IPDPS 2015, Hyderabad, India.

14. Performance Optimizations for TTI RTM on GPU based Hybrid Architectures
    Ankur Narang, Suraj Kumar, Ananda S. Das, Michael Perrone, David Wade, Kristian Bendiksen, Vidar Slatten, Tor Erik Rabben
    10th Biennial International Conference & Exposition, 2013.

15. Maximizing TTI RTM Throughput for CPU+GPU
    Ankur Narang, Suraj Kumar, Jyothish Soman, Michael Perrone, David Wade, Kristian Bendiksen, Vidar Slatten, Tor Erik Rabben
    75th EAGE Conference & Exhibition incorporating SPE EUROPEC 2013, London, UK.

16. Optimized Association Rule Mining using Genetic Algorithm
    M Anandhavalli, Suraj Kumar, Sudhanshu, Ayush Kumar
    Bioinfo Publications, Advances in information Mining. ISSN: 0975-3265,Volume 1, Issue 2, 2009.

Posters

- Scheduling of Cholesky Factorization with Lookahead Information
  Suraj Kumar, HiPC 2016.
- Scheduling Strategies and Bounds for Cholesky Factorization on Heterogeneous Platforms
  Suraj Kumar, SC 2016.
- Scheduling of Task-Based Linear Algebra Kernels on Heterogeneous Resources
  Suraj Kumar, IPDPS 2016 PhD Forum.

Awards, Competitions and Miscellaneous Information

- Student travel awards to attend SC 2016 and IPDPS 2016.
- All-India Rank 28 (top 0.03%) at the Gate Examination 2010, out of a total of about 107,000 candidates.
- Secured 1st position in programming contest organized at IIT Guwahati, India in their technical fest TECHNICHE09.

Professional Services

- Reviewer for the following conferences: SC 2024, ICPP 2022
- External reviewer for the following conferences: SPAA 2023, ICPP 2019
- Reviewer for the following international journals: IJPP since March 2018, CALC since March 2020, SIMAX since May 2020, TOMS since May 2020, SISC since May 2021, TPDS since May 2022.