Lars Arge

Curriculum Vitae
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Personal

Professor
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Danish citizen
Born October 8th, 1967 in Ebeltoft, Denmark
Partner with Alice Zhu with two bonus-sons aged 21 and 25

Brief Biography

I am a Professor of Computer Science at Aarhus University. I work in the area of algorithms and data structures, especially in the area of big data and data analytics, with main research interest in memory-hierarchy efficient algorithms, especially I/O-efficient algorithms, for problems involving big data. I have worked on theoretical big data problems in many fundamental areas, but have also investigated the practical merits of theoretically developed algorithms in several, often interdisciplinary, projects.

I obtained my Ph.D. from Aarhus University in 1996 and from 1996 to 2004 I was at Duke University in the US. I returned to Aarhus in 2004, and from 2007 to 2017 I was Director of Center for Massive Data Algorithmics (MADALGO) funded by the Danish National Research Foundation. Since 2016 I have also been Secretary General of The Royal Danish Academy of Sciences and Letters.
I have served on a large number of boards and committees. From 2013 to 2019, I was a member of the Natural Science council of Independent Research Fund Denmark, and served as vice-chair 2015-2016 and as chair 2016-2018. Currently I e.g. serve on the editorial boards the journals ACM Transactions on Spatial Algorithms and Systems, of Journal of Experimental Algorithmics, of Electronic Proceedings in Theoretical Computer Science and of Algorithmica, as well as on the boards of Videnskabsklubben, of Carlsbergs Mindelegat for Brygger J.C. Jacobsen, of the Niels Bohr Foundation and of the Aksel Tovborg Jensen Foundation (chair). I am also co-founder and chair of board of the company Scalable Algorithmics (SCALGO) that markets big terrain data processing software and data services, in particular for flood risk analysis.

Education

1996 Ph.D. Computer Science, Aarhus University, Denmark
Dissertation: *Efficient External-Memory Data Structures and Applications*
Advisor: Erik Meineche Schmidt
Committee: Mogens Nielsen (Aarhus), Joan Boyar (Odense), Roberto Tamassia (Brown)
1993 M.S. Computer Science, Aarhus University, Denmark
1990 B.S., Computer Science and Physics, Aarhus University, Denmark

Scholarships and Professional Appointments

2016 – Secretary General, The Royal Danish Academy of Science and Letters
2004 – Professor, Department of Computer Science, Aarhus University
2007 –2017 Center Director, Center for Massive Data Algorithmics (MADALGO)
2007 – 2015 Adjunct Professor, Department of Computer Science, Duke University
2006 Professor, Department of Computer Science, Duke University
2004 – 2006 Associate Professor, Department of Computer Science, Duke University
1998 – 2003 Assistant Professor, Department of Computer Science, Duke University
1996 – 1998 Assistant Research Professor, Department of Computer Science, Duke University
1996 Post-Doc, BRICS, Aarhus University
1994 – 1995 Visiting Scholar, Department of Computer Science, Duke University
1994 – 1996 Scholarship from the Faculty of Science, Aarhus University
1993 – 1994 Scholarship from Aarhus University Research Foundation
1992 – 1993 Research Assistant in the ALCOM-project, Aarhus University

Awards and Recognitions

2016 Honorary Doctorate, TU Eindhoven, the Netherlands
2015 Knighted by the Queen of Denmark
2013 Best paper award at *24th International Symposium on Algorithms and Computation* (ISAAC)
2012 Fellow of the Association of Computing Machinery (ACM)
(citation "For contributions to massive data algorithmics")
2011 Elected Member of the Danish Academy of Technical Sciences
2010 Danish Minister of Research Elite Research award ("Videnskabsministerens EliteForsk-pris")
2009 ACM Distinguished Scientist
2009 Who is who of Denmark ("Kraks blå bog")
2008 Elected Member of the Royal Danish Academy of Sciences and Letters
(Presidium since 2015, Secretary General from 2016)
2004 Ole Rømer Scholarship, the Danish National Science Research Council
2000 Career Award, US National Science Foundation

Publications

I have authored or co-authored well over 100 peer-reviewed publications, with many in top international journals or conferences. My work has been cited more than 6500 times and my h-index is 45 (according to Google Scholar). This e.g. means that I am on the exclusive unofficial list of the estimated less than 0.1% of computer scientists with h-index of at least 40 (cs.ucla.edu/~palsberg/h-number).

Note that in theoretical computer science conference (symposium and workshop) publications are highly reviewed and often more prestigious than journal publications. Also, authors normally appear in alphabetical order and only a substantial contribution result in co-authorship.

Refereed Journal Publications

1. K. Engemann, J-C. Svenning, L. Arge, J. Brandt, C. Geels, P.B. Mortensen, O. Plana-Ripoll, C. Tsirogiannis and C.B Pedersen. Natural surroundings in childhood are associated with lower schizophrenia rates. In Schizophrenia Research, 2019.

2. K. Engemann, C.B. Pedersen, L. Arge, C. Tsirogiannise, P.B. Mortensen and J-C. Svenning. Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. In *Proceedings of the National Academy of Sciences,* 2019.

3. K. Engemanna, C.B. Pedersen, L. Arge, C. Tsirogiannise, P.B. Mortensen and J-C. Svenning. Childhood exposure to green space – A novel risk-decreasing mechanism for schizophrenia? In *Schizophrenia Research*, 199: 142-148, 2018.
4. L. Arge and M. Thorup. RAM-Efficient External Memory Sorting. In Special issue of *Algoritmica, 73(4):623-636, 2015*.
5. C. Alexander, P.K. Bøcher, L. Arge and J-C. Svenning. Regional-scale mapping of tree cover, height and main phenological tree types using airborne laser scanning data. In *Remote Sensing of Environment*, 147:156-172, 2014.
6. P.K. Agarwal, L. Arge, S. Govindarajan, J. Yang and K. Yi. Efficient external memory structures for range-aggregate queries. In *Computational Geometry: Theory and Applications*, 46(3):358-370, 2013.
7. P. Afshani, P. K. Agarwal, L. Arge, K. G. Larsen and J. M. Phillips. (Approximate) uncertain skylines. In *Theory of Computing Systems*, 52(3):342-366, 2013.
8. C. Alexander, J.E. Moeslund, P.K. Bøcher, L. Arge and J.C. Svenning. Airborne laser scanner (LiDAR) proxies for understory light conditions. In *Remote Sensing of Environment*, 134:152-161, 2013.
9. J.E. Moeslund, L. Arge, P.K. Bøcher, T. Dalgaard and J.C. Svenning. Topography as a driver of local terrestrial vascular plant diversity patterns. In *Nordic Journal of Botany*, 31(2):129-144, 2013.
10. J.E. Moeslund, L. Arge, P.K. Bøcher, T. Dalgaard, M.V. Odgaard, B. Nygaard and J.C. Svenning. Topographic gradients in hydrology are primary factors in determining local vegetation patterns across a lowland region. In *Ecosphere* 7, 2013.
11. J.E. Moeslund, L. Arge, P.K. Bøcher, T. Dalgaard, R. Ejrnøs, M.V. Odgaard and J.C. Svenning. Topographically controlled soil moisture drives plant diversity patterns within grasslands. In *Biodiversity and Conservation* 22(10):2151-2166, 2013.
12. * P. K. Agarwal, L. Arge, H. Kaplan, E. Molad, R. E. Tarjan and K. Yi. An Optimal Dynamic Data Structure for Stabbing-Semigroup Queries. In *SIAM Journal of Computing*, 41(1):104-127, 2012.
13. L. Arge, G.S. Brodal and S.S Rao. External Memory Planar Point Location with Logartihmic Updates. In Algorithmics, 63(1):457-475, 2012.
14. B. S. Sandel, L. Arge, B. Dalgaard, R. Davis, K. Gaston, B. Sutherland and J.-C. Svenning. The influence of Late Quaternary climate-change velocity on species endemism. In *Science*, 334:660-664, 2011.
15. J. E. Moeslund, L. Arge, P.K. Boecher, B. Nygaard and J.-C. Svenning. Geographically Comprehensive Assessment of Salt-Meadow Vegetation-Elevation Relations Using LiDar. In *Wetlands*, 31(3):471-482, 2011.
16. P. K. Agarwal, L. Arge and K. Yi. I/O-Efficient Batched Union-Find and Its Applications to Terrain Analysis. In *ACM Transactions on Algorithms*, 7(1):11, 2010.
17. L. Arge, V. Samoladas, and K. Yi. Optimal External-Memory Planar Point Enclosure. In *Algorithmica*, 54(3):337-352, 2009.
18. L. Arge, M. de Berg, and H. Haverkort. Cache-Oblivious R-Trees. In *Algorithmica*, 53(1):50-68, 2009.
19. L. Arge, M. de Berg, H. J. Haverkort and K. Yi. The Priority R-Tree: A Practically Efficient and Worst-Case Optimal R-Tree. In *ACM Transactions on Algorithms*, 4(1), 2008.
20. L. Arge, M. A. Bender, E. D. Demaine, B. Holland-Minkley and J. I. Munro. Cache-Oblivious Priority Queue and Graph Algorithm Applications. In *SIAM Journal on Computing*, 36(6):1672-1695, 2007.
21. L. Arge, D. E. Vengroff and J. S. Vitter. External-Memory Algorithms for Processing Line Segments in Geographic Information Systems. In *Algorithmica*, 47(1):1-25, 2007.
22. L. Arge, G. Brodal and L. Toma. On External Memory MST, SSSP and Multi-way Planar Graph Separation. In *Journal of Algorithms*, 53(2):186-206, 2004.
23. L. Arge and J. Vahrenhold. I/O-Efficient Dynamic Planar Point Location. In *Computational Geometry: Theory and Applications*, 29(2):147-162, 2004.
24. L. Arge, A. Danner and S-M. Teh. I/O-Efficient Point Location using Persistent B-trees. In special issue of *ACM Journal of Experimental Algorithmics*, 8, 2003.
25. L. Arge, U. Meyer, L. Toma and N. Zeh. On External-Memory Planar Depth First Search. In special issue of *Journal of Graph Algorithms and Applications*, 7(2):105-129, 2003.

26. P. K. Agarwal, L. Arge and J. Erickson. Indexing Moving Points. In special issue of *Journal of Computer and System Sciences*, 66(1):207-243, 2003.
27. L. Arge and J. S. Vitter. Optimal External Memory Interval Management. In *SIAM Journal on Computing*, 32(6):1488-1508, 2003.
28. L. Arge. The Buffer Tree: A Technique for Designing Batched External Data Structures. In *Algorithmica*, 37(1):1-24, 2003.
29. L. Arge, J. Chase, P. Halpin, L. Toma, D. Urban, J. Vitter and R. Wickremesinghe. Efficient Flow Computation on Massive Grid Terrain Datasets. In *GeoInformatica,* 7(4):283-313, 2003.
30. L. Arge, J. Chase, J. Vitter and R. Wickremesinghe. Efficient Sorting using Registers and Caches. In special issue of *ACM Journal of Experimental Algorithmics*, 7(9), 2002.
31. L. Arge, K. H. Hinrichs, J. Vahrenhold and J. S. Vitter. Efficient Bulk Operations on Dynamic R-Trees. In special issue of *Algorithmica*, 33(1):104-128, 2002.
32. L. Arge, L. Toma and J. S. Vitter. I/O-Efficient Algorithms for Problems on Grid-based Terrains. In special issue of *ACM Journal of Experimental Algorithmics*, 6(1), 2001.
33. P. K. Agarwal, L. Arge, J. Erickson, P. Franciosa and J. S. Vitter. Efficient Searching with Linear Constraints. In special issue of *Journal of Computer and System Sciences* 61 (2):192-216, 2000.
34. L. Arge and P. B. Miltersen. On showing lower bounds for external-memory computational geometry. In *DIMACS series in Discrete Mathematics and Theoretical Computer Science*, 50:139-160, American Mathematical Society, 1999.

Refereed Conference Publications

35. L. Arge, A. Grønlund, S.C. Svendsen and J. Tranberg. Learning to Find Hydrological Corrections. In *Proceedings of ACM International Symposium on Advances in Geographic Information Systems*, SIGSPATIAL'19.
36. P.K. Agarwal, L. Arge and F. Staals. Improved Dynamic Geodesic Nearest Neighbor Searching in a Simple Polygon. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'18.
37. L. Arge, Y, Shin and C. Tsirogiannis. Computing Floods Caused by Non-Uniform Sea-Level Rise. In *Proceedings of Workshop on Algorithm Engineering and Experiments*, ALENEX 2018.
38. L. Arge, M. Rav and S.C. Svendsen. External Memory Pipelining Made Easy With TPIE. In *Proceedings of IEEE International Conference on Big Data*, 2017
39. L. Arge, M. Rav and M. Revsbæk. I/O-Efficient Event Based Depression Flood Risk. In *Proceedings of Workshop on Algorithm Engineering and Experiments*, ALENEX 2017.
40. C. Alexander, L. Arge, P.K. Bøcher, M. Revsbæk, B. Sandel, J-C. Svenning, C. Tsirogiannis and J. Yang. Computing River Floods Using Massive Terrain Data. In *Proceedings of International Conference on Geographic Information Science*, GIScience 2016.
41. L. Arge, J. Truelsen and J. Yang. Simplifying massive planar subdivisions. In *Proceedings of Workshop on Algorithm Engineering and Experiments*, ALENEX 2014.
42. L. Arge and M. Thorup. RAM Efficient External Memory Algorithm. In *Proceedings of International Symposium on Algorithms and Computation*, ISAAC'13 (Best paper award).
43. L. Arge, M. Goodrich and F. van Walderveen. Computing Betweenness Centrality in External Memory. In *Proceedings of IEEE International Conference on Big Data*, IEEE BigData 2013.
44. L. Arge, M. De Berg and C. Tsirogiannis. Algorithms for Computing Prominence on Grid Terrains. In *Proceedings of International Conference on Advances in Geographic Information Systems*, ACM-GIS'13.
45. L. Arge, G. S. Brodal, J. Truelsen and C. Tsirogiannis. An Optimal and Practical Cache-Oblivious Algorithm for Computing Multiresolution Rasters. In *Proceedings of European Symposium on Algorithm*, ESA'13.
46. L. Arge, J. Fischer, P. Sanders and N. Sitchinava. On (Dynamic) Range Minimum Queries in External Memory. In *Proceedings of Seventh Workshop on Algorithms and Data Structures*, WADS'13.
47. L. Arge, F. van Walderveen and N. Zeh. Multiway simple cycle separators and I/O-efficient algorithms for planar graphs. In *Proceedings of Annual ACM-SIAM Symposium on Discrete Algorithms*, SODA'13.

48. L. Arge, H. Haverkort and C. Tsirogiannis. Fast generation of multiple resolution instances of raster data sets. In *Proceedings of International Conference on Advances in Geographic Information Systems*, ACM-GIS'12.
49. L. Arge, L. Deleuran, T. Moelhave, M. Revsbaek and Jakob Truelsen. Simplifying Massive Contours Maps. In *Proceedings of European Symposium on Algorithm*, ESA'12.
50. P. Afshani, L. Arge and K. Green Larsen. Higher-dimensional orthogonal range reporting and rectangle stabbing in the pointer machine model. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'12.
51. P. Afshani, P.K. Agarwal, L. Arge, K.G. Larsen and J.M. Phillips. (Approximate) uncertain skylines. In *Proceedings of International Conference on Database Theory*, ICDT'11.
52. L. Arge, K.D. Larsen, T. Moelhave and F. van Walderveen. Cleaning Massive Sonar Point Data. In *Proceedings of International Conference on Advances in Geographic Information Systems*, ACM-GIS'10.
53. T. Molhave, P. K. Agarwal, L. Arge and M. Revsbaek. Scalable Algorithms for Large High-Resolution Terrain Data. In *Proceedings of International Conference on Computing for Geospatial Research and Applications*, COM.GEO'10.
54. P. Afshani, L. Arge and K. Dalgaard Larsen. Orthogonal Range Reporting: Query lower bounds, optimal structures in 3-d, and higher-dimensional improvements. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'10.
55. L. Arge, M. Revsbaek and Norbert Zeh. I/O-efficient computation of water flow across a terrain. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'10.
56. L. Arge, M. Goodrich and N. Sitchinava. Parallel External Memory Graph Algorithms. In *Proceedings of IEEE International Parallel and Distributed Processing Symposium*, IPDPS'10.
57. L. Arge and M. Revsbaek. I/O-Efficient Contour Tree Simplification. In *Proceedings of Annual International Symposium on Algorithms and Computation*, ISAAC'09.
58. P. Afshain, L. Arge and K. D. Larsen. Orthogonal Range Reporting in Three and Higher Dimensions. In *Proceedings of Annual IEEE Symposium on Foundations of Computer Science*, FOCS'09.
59. L. Arge, T. Moelhave and N. Zeh. Cache-Oblivious Red-Blue Line Segment Intersection. In *Proceedings of European Symposium on Algorithm*, ESA'08.
60. L. Arge, M.T. Goodrich, M. Nelson and N. Sitchinava. Fundamental Parallel Algorithms for Private-Cache Chip Multiprocessors. In *Proceedings of ACM Symposium on Parallelism in Algorithms and Architectures*, SPAA'08.
61. P.K. Agarwal, L. Arge, T. Moelhave and B. Sadri. I/O-efficient Algorithms for Computing Contour Lines on a Terrain. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'08.
62. L. Arge, G.S. Brodal and S.S Rao. External Memory Planar Point Location with Logarithmic Updates. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'08.
63. P. K. Agarwal, L. Arge, A. Danner, H. Mitasova, T. Mølhave and K. Yi. TerraStream: From Elevation Data to Watershed Hierarchies. In *ACM International Symposium on Advances in Geographical Information Systems*, ACM-GIS'07.
64. M. Westergaard, L.M. Kristensen, G.S. Brodal and L. Arge. The ComBack Method - Extending Hash Compaction with Backtracking. In *Proceedings of International Conference on Application and Theory of Petri Nets and Other Models of Concurrency*, Petri Nets 2007.
65. P. K. Agarwal, L. Arge and K. Yi. I/O-Efficient Batched Union-Find and Its Applications to Terrain Analysis. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'06.
66. L. Arge, G. S. Brodal and L. Georgiadis. Improved Dynamic Planar Point Location. In *Proceedings of IEEE Symposium on Foundations of Computer Science*, FOCS'06.
67. P. K. Agarwal, L. Arge and A. Danner. From Point Cloud to GRID DEM: A Scalable Approach. In *Proceedings of International Symposium on Spatial Data Handling*, SDH'06.
68. L. Arge, A. Danner, H. Haverkort and N. Zeh. I/O-Efficient Hierarchical Watershed Decomposition of Grid Terrain Models. In *Proceedings of International Symposium on Spatial Data Handling*, SDH'06.

69. L. Arge and N. Zeh. Simple and Semi-Dynamic Structures for Cache-Oblivious Planar Orthogonal Range Searching. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'06.
70. P. K. Agarwal, L. Arge and K. Yi. An Optimal Dynamic Interval Stabbing-Max Data Structure? In *Proceedings of ACM-SIAM Symposium on Discrete Algorithms*, SODA'05.
71. L. Arge, M. de Berg and H. Haverkort. Cache-Oblivious R-Trees. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'05.
72. L. Arge and L. Toma. External Data Structures for Shortest Path Queries on Planar Digraphs. In *Proceedings of International Symposium on Algorithms and Computation*, ISAAC'05.
73. P. K. Agarwal, L. Arge and K. Yi. I/O-efficient Construction of Constrained Delaunay Triangulations. In *Proceedings of European Symposium on Algorithm*, ESA'05.
74. L. Arge, D. Eppstein and M. Goodrich. Skip-Webs: Efficient Distributed Data Structures for Multi-Dimensional Data Sets. In *Proceedings ACM SIGACT-SIGOPS Symposium on Principles Of Distributed Computing*, PODC'05.
75. L. Arge, G. S. Brodal, R. Fagerberg and M. Laustsen. Cache-Oblivious Planar Orthogonal Range Searching and Counting. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'05.
76. L. Arge, V. Samoladas and K. Yi. Optimal External-Memory Planar Point Enclosure. In *Proceedings of European Symposium on Algorithm*, ESA'04.
77. L. Arge, M. de Berg, H. J. Haverkort and K. Yi. The Priority R-Tree: A Practically Efficient and Worst-Case Optimal R-Tree. In *Proceedings of ACM SIGMOD International Conference on Management of Data*, SIGMOD'04.
78. P. K. Agarwal, L. Arge, J. Erickson and H. Yu. Efficient Tradeoff Schemes in Data Structures for Querying Moving Objects. In *Proceedings of European Symposium on Algorithm*, ESA'04.
79. L. Arge, U. Meyer and L. Toma. External Memory Algorithms for Diameter and All-Pair Shortest-Paths on Sparse Graphs. In *Proceedings of International Colloquium on Automata, Languages, and Programming*, ICALP'04.
80. L. Arge and L. Toma. Simplified External Memory Algorithms for Planar DAGS. In *Proceedings of Eleventh Scandinavian Workshop on Algorithm Theory*, SWAT'04.
81. P. K. Agarwal, L. Arge, J. Yang and K. Yi. I/O-Efficient Structures for Orthogonal Range Max and Stabbing Max Queries. In *Proceedings of European Symposium on Algorithm*, ESA'03.
82. S. Govindarajan, P. K. Agarwal and L. Arge. CRB-tree: An Efficient Indexing Scheme for Aggregate Queries. In *Proceedings of International Conference on Database Theory*, ICDT'03.
83. L. Arge, A. Danner and S-M. Teh. I/O-Efficient Point Location using Persistent B-trees. In *Proceedings of Workshop on Algorithm Engineering and Experiments*, ALENEX'03.
84. L. Arge and N. Zeh. I/O-Efficient Strong Connectivity and Depth-First Search for Directed Planar Graphs. In *Proceedings of IEEE Symposium on Foundation of Computer Science*, FOCS'03.
85. O. Procopiuc, P. K. Agarwal, L. Arge and J. S. Vitter. Bkd-tree: A Dynamic Scalable kd-Tree. In *Proceedings International Symposium on Spatial and Temporal Databases*, SSTD'03.
86. L. Arge and A. Chatham. Efficient Object-Relational Interval Management and Beyond. In *Proceedings International Symposium on Spatial and Temporal Databases*, SSTD'03.
87. L. Arge, L. Toma and N. Zeh. I/O-Efficient Topological Sorting of Planar DAGs. In *Proceedings of ACM Symposium on Parallelism in Algorithms and Architectures*, SPAA'03.
88. P. K. Agarwal, L. Arge, A. Danner and B. Holland-Minkley. Cache-oblivious Data Structures for Orthogonal Range Searching. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'03.
89. L. Arge, M. A. Bender, E. D. Demaine, B. Holland-Minkley and J. I. Munro. Cache-Oblivious Priority Queue and Graph Algorithm Applications. In *Proceedings of ACM Symposium on Theory of Computation*, STOC'02.
90. L. Arge, O. Procopiuc and J. S. Vitter. Implementing I/O-Efficient Data Structures using TPIE. In *Proceedings of European Symposium on Algorithms*, ESA'02.

91. L. Arge, J. Chase, P. Halpin, L. Toma, D. Urban, J. Vitter and R. Wickremesinghe. Flow Computation on Massive Grids. In *Proceedings of ACM International Symposium on Advances in Geographical Information Systems*, ACM-GIS'01.
92. L. Arge, U. Meyer, L. Toma and N. Zeh. On External-Memory Planar Depth First Search. In *Proceedings of Workshop on Algorithms and Data Structures*, WADS'01.
93. P. K. Agarwal, L. Arge and J. Vahrenhold. Time Responsive External Data Structures for Moving Points. In Proceedings of Seventh Workshop on Algorithms and Data Structures, WADS'01.
94. P. K. Agarwal, L. Arge, O. Procopiuc and J. S. Vitter. A Framework for Index Bulk Loading and Dynamization. In *Proceedings of International Colloquium on Automata, Languages, and Programming*, ICALP'01.
95. L. Arge, J. Chase, J. Vitter and R. Wickremesinghe. Efficient Sorting using Registers and Caches. In Proceedings of *Workshop on Algorithm Engineering*, WAE'00.
96. P. K. Agarwal, L. Arge and J. Erickson. Indexing Moving Points. In *Proceedings of ACM Symposium on Principles of Database Systems*, PODS'00.
97. L. Arge, G. Brodal and L. Toma. On External Memory MST, SSSP and Multi-way Planar Graph Separation. In *Proceedings of Scandinavian Workshop on Algorithm Theory*, SWAT'00.
98. L. Arge, L. Toma and J. S. Vitter. I/O-Efficient Algorithms for Problems on Grid-based Terrains. In *Proceedings of Workshop on Algorithm Engineering and Experimentation*, ALENEX'00.
99. L. Arge and J. Vahrenhold. I/O-Efficient Dynamic Planar Point Location. In *Proceedings of ACM Symposium on Computational Geometry*, SoCG'00.
100. L. Arge and J. Pagter. I/O-Space Trade-Offs. In *Proceedings of Scandinavian Workshop on Algorithm Theory*, SWAT'00.
101. L. Arge, O. Procopiuc, S. Ramaswamy, T. Suel, J. Vahrenhold and J. S. Vitter. A Unified Approach for Indexed and Non-Indexed Spatial Joins. In *Proceedings of Conference on Extending Database Technology*, EDBT'00.
102. L. Arge, K. H. Hinrichs, J. Vahrenhold and J. S. Vitter. Efficient Bulk Operations on Dynamic R-Trees. In *Proceedings of Workshop on Algorithm Engineering and Experimentation*, ALENEX'99.
103. L. Arge, V. Samoladas and J. S. Vitter. On Two-Dimensional Indexability and Optimal Range Search Indexing. In *Proceedings of ACM Symposium on Principles of Database Systems*, PODS'99.
104. P. K. Agarwal, L. Arge, G. S. Brodal and J. S. Vitter. I/O-Efficient Dynamic Point Location in Monotone Planar Subdivisions. In *Proceedings of ACM-SIAM Symposium on Discrete Algorithms*, SODA'99.
105. P. K. Agarwal, L. Arge, J. Erickson, P. Franciosa and J. S. Vitter. Efficient Searching with Linear Constraints. In *Proceedings of ACM Symposium on Principles of Database Systems*, PODS'98.
106. L. Arge, O. Procopiuc, S. Ramaswamy, T. Suel and J. S. Vitter. Scalable Sweeping-Based Spatial Join. In *Proceedings of International Conference on Very Large Data Bases*, VLDB'98.
107. L. Arge, O. Procopiuc, S. Ramaswamy, T. Suel and J. S. Vitter. Theory and Practice of I/O-Efficient Algorithms for Multidimensional Batched Searching Problems. In *Proceedings of ACM-SIAM Symposium on Discrete Algorithms*, SODA'98.
108. P. K. Agarwal, L. Arge, T. M. Murali, K. Varadarajan and J. S. Vitter. I/O-Efficient Algorithms for Contour Line Extraction and Planar Graph Blocking. In *Proceedings of ACM-SIAM Symposium on Discrete Algorithms*, SODA'98.
109. L. Arge, P. Ferragina, R. Grossi and J. S. Vitter. On Sorting Strings in External Memory. In *Proceedings of ACM Symposium on Theory of Computation*, STOC'97.
110. L. Arge and J. S. Vitter. Optimal Dynamic Interval Management in External Memory. In *Proceedings of IEEE Symposium on Foundation of Computer Science*, FOCS'96.
111. L. Arge. The Buffer Tree: A New Technique for Optimal I/O-Algorithms. In *Proceedings of Workshop on Algorithms and Data Structures*, WADS'95.
112. L. Arge, D. E. Vengroff and J. S. Vitter. External-Memory Algorithms for Processing Line Segments in Geographic Information Systems. In *Proceedings of European Symposium on Algorithm*, ESA'95.

113. L. Arge. The I/O-Complexity of Ordered Binary-Decision Diagram Manipulation. In *Proceedings of International Symposium on Algorithms and Computation*, ISAAC'95.
114. L. Arge, M. Knudsen and K. Larsen. A General Lower Bound on the I/O-Complexity of Comparison-based Algorithms. In *Proceedings of Workshop on Algorithms and Data Structures*, WADS'93.

Other Publications

115. L. Arge, M. Rav, M. Revsbæk, Y. Shin and J. Yang. Sea-rise Flood Prediction on Massive Dynamic Terrains. Manuscriprt.
116. P.K. Agarwal, L. Arge, Y. Shin and F. Staals. I/O-Efficient Algorithms for Shortest Path Problems in Simple Polygons. Manuscript.
117. L. Arge and J. Pach. Proceedings of 31st International Symposium on Computational Geometry, SoCG 2015
118. L. Arge and K.G. Larsen. I/O-efficient spatial data structures for range queries. In *SIGSPATIAL Special*, 4(2), 2-7, 2012.
119. B. Sandel, L. Arge, B. Dalsgaard, R.G. Davies, K.J. Gaston, W.J. Sutherland and J.C. Svenning. Response--Global Endemism Needs Spatial Integration. In *Science* 335, 285-286, 2012.
120. B.S. Sandel, L. Arge and J.-C. Svenning. Climate change velocity since the Last Glacial Maximum and its importance for patterns of species richness and range size. In *Biennial Conference of the International Biographical Society*, 2011.
121. B.S. Sandel, B. Dalsgaard, L. Arge and J.-C. Svenning. Late Quaternary climate-change velocity: Implications for modern distributions and communities. In *Ecological Society of America*, 2011.
122. H. Balslev, L. Arge, J.-C. Svenning, M.H. Schierup and C.J. Jensen. Abstracts of Royal Danish Academy of Science Symposium on Biodiversity in the Silicon Age.
123. L. Arge and N. Zeh. External-memory Algorithms and Data Structures. In *Algorithms and Theory of Computation Handbook* (Second Edition), M. J. Atallah (Eds.), CRC Press, 2010.
124. L. Arge. Recent Advances in Worst-Case Efficient Range Search Indexing (Invited Paper). In *Proceedings of International Symposium on Spatial and Temporal Databases*, SSTD'09.
125. L. Arge. Worst-case Efficient Range Search Indexing (Invited Tutorial). In *Proceedings of ACM Symposium on Principles of Database Systems*, PODS'09.
126. L. Arge, C. Cachin, T. Jurdzinski and A. Tarlecki. Proceedings of International Colloquium on Automata, Languages and Programming, ICALP'07.
127. L. Arge, M. Hoffmann and E. Welzl. Proceedings of Annual European Symposium on Algorithms, ESA'07.
128. H. Mitasova, P. K. Agarwal, L. Arge, T. Mølhave and R. S. Harmon. Multiscale Geomorphometric and Stream Network Analysis using IFSAR and SRTM Digital Surface Models. In *GSA Denver Annual Meeting*, 2007.
129. L. Arge and R. Freivalds. Proceedings of Scandinavian Workshop on Algorithm Theory, SWAT'06.
130. L. Arge, G. S. Brodal and R. Fagerberg. Cache-oblivious Data Structures. In *Handbook on Data Structures and Applications*, D. Mehta and S. Sahni (Eds.), CRC Press, pages 34.1-34.27, 2005.
131. L. Arge. External Geometric Data Structures (Invited Paper). In *Proceedings of International Computing and Combinatorics Conference*, COCOON'04.
132. L. Arge, G. Italiano and R. Sedgewick. Proceedings of the Sixth Workshop on Algorithm Engineering and Experiments, ALENEX'04
133. L. Arge. Implementing External Memory Algorithms and Data Structures (Invited Paper). In *Proceedings of Workshop on Algorithm Engineering and Experiments*, ALENEX'03.
134. L. Arge. External-Memory Data Structures. In *Handbook of Massive Data Sets*, J. Abello, P. M. Pardalos, and M. G. C. Resende (Eds.), Kluwer Academic Publishers, pages 313-357, 2002.
135. L. Arge. External Memory Data Structures (Invited Paper). In *Proceedings of European Symposium on Algorithm*, ESA'01.
136. L. Arge, P. Ferragina, R. Grossi and J. S. Vitter. Sorting Sequences in Secondary Storage (Invited paper). In *Proceedings of Compression and Complexity of Sequences*, SEQUENCES 1997.

137. L. Arge. External-Memory Algorithms with Applications in Geographic Information Systems. In *Algorithmic Foundations of GIS*, M. van Kreveld, J. Nievergelt, T. Roos and P. Widmayer (Eds.), LNCS Tutorial, Lecture Notes in Computer Science 1340, Springer-Verlag, 1997.
138. L. Arge. Efficient External-Memory Data Structures and Applications. Ph.D. Dissertation, University of Aarhus, Denmark, February/August 1996. Appears as DS-96-3 in BRICS dissertation series.

Editorial Responsibilities

2013 – Member of Editorial Board of *ACM Transactions on Spatial Algorithms and Systems*
2009 – Member of Editorial Board of *Journal of Experimental Algorithmics*
2009 – Member of Editorial Board of *Electronic Proceedings in Theoretical Computer Science*
2000 – Member of Editorial Board of *Algorithmica*
2009 – 2011 Member of Editorial Board of *Journal of Computational Geometry*
2005 – 2011 Member of Editorial Board of *Journal of Graph Algorithms and Applications*
2004 – 2012 Member of Editorial Board of *Journal of Discrete Algorithms*
2006 – 2007 Area Editor of *Encyclopedia of Algorithms*
2007 – 2008 Guest Co-Editor, Special Issue of *Algorithmica*
2007 – 2008 Guest Co-Editor, Special Issue of *Theoretical Computer Science*
2000 – 2001 Guest Co-Editor, Special Issue of *Computational Geometry: Theory and Applications*
2004 Guest Co-Editor, Special Issue of *ACM Journal of Experimental Algorithmics*

Program Committees

2015 *Co-Chair* of program committee for *31th International Symposium on Computational Geometry* (SoCG'15)
Member of program committee for *13th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'15)
Member of program committee for *17th Workshop on Algorithm Engineering and Experiments* (ALENEX'15)
2014 Member of program committee for *12th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'14)
Member of program and organizing committee for *6th Workshop on Massive Data Algorithmics* (MASSIVE'12)
2013 Member of program committee for *11th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'13)
Member of program and organizing committee *for 5th Workshop on Massive Data Algorithmics* (MASSIVE'12)
2012 Member of program committee for *10th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'12)
Member of program committee for *23th International Symposium on Algorithms and Computation* (ISAAC'12)
2011 Member of program committee for *9th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'11)
Member of program and organizing committee for Royal Danish Academy of Science and Letters *Symposium on Biodiversity in the Silicon Age*
Member of program and organizing committee for *3rd Workshop on Massive Data Algorithmics* (MASSIVE'11)
Member of program committee *for 5th international Frontiers of Algorithmics Workshop* (FAW'11)
Member of program committee for *27th Annual Symposium on Computational Geometry* (SoCG'11)
Member of program committee for *27th International Conference on Data Engineering* (ICDE'11)

2010 Member of program committee for *8th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'10)
Member of program committee for *21th International Symposium on Algorithms and Computation* (ISAAC'10)
Member of program committee for *20th ACM-SIAM Symposium on Discrete Algorithms* (SODA'10)
Member of program and organizing committee for *Dagstuhl seminar on Data Structures*
Member of program and organizing committees for *2nd Workshop on Massive Data Algorithmics* (MASSIVE'10)

2009 Member of program committee for *7th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'09)
Member of program committee for *15th International Computing and Combinatorics Conference* (COCOON'09)
Member of program committee for *11th International Symposium on Spatial and Temporal Databases* (SSTD'09)
Member of program and organizing committees for *Workshop on Massive Data Algorithmics* (MASSIVE'09)

2008 Member of program committee for 6*th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'08)
Member of program committee for *19th International Symposium on Algorithms and Computation* (ISAAC'08)
Member of program committee for *19th Annual Symposium on Combinatorial Pattern Matching* (CPM 2008)
Member of program committee for *7th International Workshop on Experimental Algorithms* (WEA'08)
Member of program and organizing committee for *Dagstuhl seminar on Data Structures*

2007 Member of program committee for *5th ACM International Symposium on Advances in Geographic Information Systems* (ACM GIS'07)
Chair of track A program committee for *34rd International Colloquium on Automata, Languages and Programming* (ICALP'07)
Member of program committee for *10th International Symposium on Spatial and Temporal Databases* (SSTD'07)
Member of program committee for *23rd International Conference on Data Engineering* (ICDE'07)
Chair of program committee for engineering and applications track of *15th Annual European Symposium on Algorithms* (ESA'07)

2006 Member of program committee for *3rd International Workshop on Spatio-Temporal Database Management* (STDBM 2006)
Co-chair of program committee for *10th Scandinavian Workshop on Algorithm Theory* (SWAT'06)
Member of program committee for *14th Annual European Symposium on Algorithms* (ESA'06)
Member of program and organizing committee for *Dagstuhl seminar on Data Structures*

2005 Member of program and organizing committee for *Workshop on Massive Geometric Data Sets*
Member of program committee for *31th International Conference on Very Large Data Bases* (VLDB'05)
Member of program committee for *32nd International Colloquium on Automata, Languages and Programming* (ICALP'05)
Member of program committee for *10th International Conference on Database Theory* (ICDT'05)

2004 Member of program committee for *2nd Workshop on Spatial-Temporal Database Management* (STDBM'04)
Member of program committee for *15th International Symposium on Algorithms and Computation* (ISAAC'04)

Member of program committee for *3rd International Conference on Fun with Algorithms* (FUN'04)
Co-chair of program committee for *6th Workshop on Algorithm Engineering and Experiments* (ALENEX'04)
Member of program committee for *15th ACM-SIAM Symposium on Discrete Algorithms* (SODA'04)
Member of program and organizing committee for *Dagstuhl seminar on Cache-Oblivious and Cache-Aware Algorithms*

2003 Member of program committee for ICALP Satellite *Workshop on Algorithms for Massive Data Sets*
Member of program committee for *7th Workshop on Algorithms And Data Structures* (WADS'03)
Member of program committee for *8th International Symposium on Spatial and Temporal Databases* (SSTD'03)

2002 Member of program committed for *Open source GIS - GRASS users conference* (Open-GIS'02)

2001 Member of program committee for *7th International Symposium on Spatial and Temporal Databases* (SSTD'01)

2000 Member of program committee for *8th Annual European Symposium on Algorithms* (ESA'00)
Review chair and member of program committee for *12th ACM Symposium on Parallel Algorithms and Architectures* (SPAA'00)

1999 Member of program committee for *4th CGC Workshop on Computational Geometry* (CGC'99)
Member of program committee for *Workshop on Spatial-Temporal Database Management* (STDBM'99)
Member of program committee for *3rd Workshop on Algorithm Engineering* (WAE'99)

1998 Member of program committee for *3rd CGC Workshop on Computational Geometry* (CGC'98)

1997 Member of program committee for *2nd CGC Workshop on Computational Geometry* (CGC'98)

Grants

- L. Arge (PI) and Gerth S. Bridal. *Algorithms supporting big data analysis.* Independent Research Fund Denmark, program on Digital Technologies, ~5.900.000 DKR.
- O. Lehrmann Madsen et al. *Danish Center for Big Data Analytics driven Innovation (DABAI).* Innovation Fond Denmark, 45.000.000 DKR (excluding co-funding from a large number of authorities and companies)
- M. Revsbæk et al. *Det dynamiske skybrudskort.* RealDania Klimaspring
- L. Arge (PI). Algo 2016 conference. Carlsberg Foundation, 60.000 DKR
- L. Arge (PI), M. Revsbæk and H. Winther. *Realistic large-area food risk screening*. The Danish National Advanced Technology Foundation, ~2.800.000 DKR (excluding co-funding from COWI A/S and SCALGO Development ApS)
- L. Arge, A.G. Jørgensen and A. Midtgaard. *Adaptive Data Correlation*. The Danish National Advanced Technology Foundation, ~ 1.800.000 DKR (excluding co-founding from AU and DSE A/S)
- L. Arge (PI) *Center for massive data algorithmics* (continuation). The Danish National Research Foundation, 40.000.000 DKR (excluding co-funding)
- L. Arge and K.D. Larsen. *Google European Doctoral Fellowship in Search and Information Retrieval*. Google, ~1.000.000 DKR
- Brodnik et al. *Processing of Massive Geometric Data*. Slovenian Research Agency, ~2.000.000 DKR
- L. Arge and J.C. Svenning. *Center for Interdiciplinary Geospatial Informatics Research*. Aarhus University Research Foundation, ~2.500.000 DKR
- L. Arge. Quality promotion funds (Post Doc Support). The Danish Agency for Science, Technology and Innovation, ~250.000 DKR
- L. Arge. *Danish Minister of Research Elite Research award* ("Videnskabsministerens EliteForsk pris"), 1.200.000 DKR
- L. Arge. *Visiting Professor grant for Norbert Zeh*. VELUX Visiting Professor Program, ~80.000 DKR

- P. K. Agarwal, L. Arge and H. Mitasova. *STREAM: Scalable techniques for High Resolution Elevation Data Analysis and Modeling*. US Army Research office, ~$520.000
- Drysdale et al. *A platform for Galileo based pervasive positioning*. The Danish National Advanced Technology Foundation, AU part ~11.700.000 DKR
- L. Arge (PI). *Center for massive data algorithmics*. The Danish National Research Foundation, 30.000.000 DKR (excluding co-funding)
- Ole Hørbye Jacobsen et al., *GEORAP: Geology-dependent Variations in Transport Processes with respect to Risk Assessment of Phosphorus Loss*. Danish Directorate for Food, Fisheries and Agri Business, AU part, ~150.000 DKR
- L. Arge, S. Bødker and M. Nielsen. *Distinguished Visiting Professors Program*. VELUX Visiting Professor Program, ~300.000 DKR
- L. Arge (PI), P. K. Bøcher, K. Keller and J. K. Rasmussen. *Efficient Handling of Massive Heterogeneous Terrain Data*. Danish Strategic Research Council, ~6.700.000 DKR
- P. Agarwal, L. Arge and H. Mitasova. *Modeling and Analyzing Terrain Data Acquired by Modern Mapping Techniques*. US Army Research Office, ~$460.000
- L. Arge (PI). *Algorithms for Processing Massive Datasets: Theory and Practice*. Ole Rømer Scholarship, Danish National Science Research Council, ~5.700.000 DKR
- L. Arge (PI) and J. Vahrenhold. *Efficient Algorithms for Spatial Databases, Bridging the Gap between Theory and Practice*. US National Science Foundation, ~$ 19.000
- L. Arge (PI), M. Bender, and E. Demaine. *Cache-Oblivious Data Structures*. US National Science Foundation, ~$450.000
- L. Arge (PI). *CAREER: I/O-Efficient Geometric Algorithms*. US National Science Foundation, ~$240.000
- J. S. Chase et al. *Data-Intensive Computing with Spatial Models*. US National Science Foundation, ~$1.550.000
- J. S. Vitter et al. *Microsoft Teaching Lab*. Microsoft corporation, ~$1.100.000
- P. K. Agarwal, L. Arge and J. S. Vitter. *Models and Algorithms for Several Levels of Memory*. Los Alamos National Laboratory, ~$50.000
- J. S. Chase et al. *Geographic Information Systems on High-Speed Clusters: A Vertically Integrated Approach*. US National Science Foundation, ~$1.600.000
- S. Ellis et al. *Fellowships in Experimental Computer Science*. U.S. Department of Education, ~$500.000

Artifacts

TerraFlow and TerraStream

TerraFlow is a software package for computing flow routing and flow accumulation on massive grid-based terrains. TerraFlow functionality has also been incoorporated in (the open-source GIS system) GRASS and in an extension to (the commercial GIS system) ArcGIS. The package was improved in terms of efficiency and stability in the Terrastream project, where significant new functionality was also added.

TPIE

TPIE is a software package that allows for simple, efficient, and portable implementation of I/O-efficient algorithms. The original version of TPIE was developed by Darren Vengroff and the system has subsequently been substantially improved for efficiency and functionality.

Commercialization

Scalable Algorithmics (SCALGO)
SCALGO was established in late 2009 to commercialize I/O-efficient technology for efficient processing of massive terrain data. SCALGO now has 15 employees (most with PhD degrees) and are providing flood risk analysis tools to a large number of engineering and utility companies, as well as government agencies and municipalities, in Denmark, Sweden, Norway and Finland (as well as globally). I served as Chairman of the Board.

Invited Lectures

I have given numerous contributed lectures at research conferences, as well as invited lectures (on scientific results and policy issues) at conferences, international schools, universities, research laboratories, as well as (science lectures for general audiences) at public events. Below most invited lectures (and thus not contributed lectures and internal or closed lectures) are listed.

At Conferences, International Schools and Public Events

2019 "Algoritmer – det Mulige og Umulige". Lecture at "forskningens døgn" in the Royal Danish Academy of Science and Letters (with Kasper Green Larsen).

2017 *Flood Risk Analysis using Massive Terrain Data*. Invited lecture at Workshop on Practical Methods for Solving Computational Geometry Problems, CG week.
I/O-Efficient Algorithms for Flood Risk Analysis using Massive Terrain Data. Invited lecture at Symposium Facets of Data Analytics, TU/e.
Efficient Algorithms for Flood Risk Analysis. Invited talk at DABAI research conference.

2016 *Flood-risk Screening using Detailed and Massive Terrain Data.* Keynote at Global Digital Soil Mapping Workshop.
Effective Big Data algorithms and flood risk assessment. Public lecture, The Royal Danish Academy of Science and letters.
Big data and effective algorithms. Lecture in public lectures in natural science series, Aarhus University (two lectures)
Big data and effective algorithms. Lecture in public lectures in natural science series, Vejle.
Big data and effective algorithms. Lecture in public lectures in natural science series, Horsens.
Big data and effective algorithms. Lecture in public lectures in natural science series, Herning.

2015 *Algorithms for massive terrain data analysis*. Lecture at Dutch Data Science Summit 2015
Intelligent use of terrain model for screening solutions. Lecture at Danish Society of Engineers, EVA committee conference
Big Data Big Impact. Keynote lecture at NNmarkedsdata Data Intelligence Conference
Efficient Processing of Big Terrain Data. Keynote lecture at GIS Innovation Forum Conference
Big Data Possibilities and Challenges. Lecture at Folkeuniversitetet, Copenhagen
Big Data Possibilities and Challenges. Lecture at Folkeuniversitetet, Aarhus

2014 *I/O-efficient algorithms for big terrain data analysis*. Keynote lecture at annual Meeting of the DFG Algorithm Engineering special program
Big Data Possibilities and Challenges. Keynote talk at Aarhus University Big Data Big Impact conference
Academic leadership: what does it take? Invited talk at EuroScience open forum (ESOF) Science Policy Program workshop

Tenure-track from a center leaders perspective. Invited lecture at Royal Danish Academy of Science and Letters annual research policy meeting
Turning Big Terrrain Data into Knowledge. Invited lecture at BrainsBusiness conference on creating value with big data

2013 *I/O-efficient Geometric Algorithms and Data Structures*. Four lectures at Microsoft School on Algorithms for Masssive Data (ALMADA)

2012 *I/O and Geometry: Flood Simulation Using Massive Terrain Data*. Invited talk at STOC Workshop on Algorithms for Memory-Sensitive Computing
Big Terrain Data Analysis. Invited talk at SoCG Workshop on Algorithms in the Field
I/O-efficient Algorithms for Processing Big Terrain Data. Invited talk at ARO Big Data at Large Workshop

2011 *I/O-efficient Algorithms for Processing Massive Terrain Data*. Invited talk at European Symposium on Algorithms (ESA)
Efficient Sonar Data Cleaning. Lecture at Seabed Mapping and Inspection conference
Algorithms for Handling Massive Datasets. Invited lecture at KAUST computer science Hot Trends in Computer Science workshop
Efficient Massive Terrain Data Processing. Invited lecture at Royal Danish Academy of Science and Letters Biodiversity in the Silicon Age Symposium

2010 *Orthogonal Range Reporting in 3 and Higher Dimensions*. Invited lecture at IMPECS workshop on geometric computing
Algoritmer til Håndtering af Massive Datamængder. Lecture at Royal Danish Academy of Science and Letters

2009 *Recent Advances in Worst-Case Efficient Range Search Indexing*. Keynote talk at International Symposium on Spatial and Temporal Databases (SSTD)
Worst-Case Efficient Range Search Indexing. Invited tutorial at ACM Symposium on Principles of Database Systems (PODS)
Oversvømmelses og vandstrømning. Invited lecture at COWI GIS konference
Massive data Algoritmics. Keynote at Danish Computer Science Association meeting

2008 *Algorithms for Handling Massive (Height) Datasets*. Invited lecture at Nordic Geodetic Commission taskforce workshop
Algorithmer til håndtering af store datamængder. Invited lecture at GeoForum seminar.

2007 *Effektiv håndtering og analyse af MASSIVE datasæt*. Invited lecture at Teknologisk Institut conference
I/O-efficient algorithms and data structures. Four lectures at NORFA Summer School on Algorithmic Data Analysis (SADA07)

2006 *Efficient Algorithms for Hierarchical Memory*. Lecture at University of Trondheim and Google (Google Speaker Series)

2005 *I/O-efficient Geometric Algorithms and Data Structures*. Three half-day lectures at Summer School at Korean Advanced Institute of Science and Technology
I/O-Efficeint Geometric Algorithms and Data Structures. Three lectures at Spring School before European Workshop on Computational Geometry

2004 *Memory-Hierarchy Efficient Dynamic Orthogonal Range Searching*. Invited lecture at Workshop on Algorithms for Dynamic Data, pre-workshop to FSTTCS conference
External Geometric Data Structures. Invited lecture at Tenth International Computing and Combinatorics Conference

2003 *Implementing External Memory Algorithms and Data Structures*. Invited lecture at 5th Workshop on Algorithm Engineering and Experiments

2002 *External Memory Geometric Data Structures*. Seven lectures at EEF Summer School on Massive Data Sets

2001 *External Memory Data Structures*. Invited lecture at 9th Annual European Symposium

on Algorithms

1999 *External Memory Graph Algorithms Using External Data Structures*. Invited lecture at SIAM Annual Meeting, minisymposium on External Graph Algorithms

1996 *External memory algorithms in Geographic Information Systems*. Two lectures at CISM Advanced School on Algorithmic Foundation of GIS

At Universities and Research Laboratories

2016 *I/O-efficient Algorithms for Flood-Risk Screening using Detailed and Massive Terrain Data*. U.S. Army Engineer Research and Development Center, Vicksburg, USA.

2014 *Big data algorithmics*. Changzhu National University, China
I/O-efficient Algorithms for Processing Massive Terrain Data. Renmin University, China

2011 *I/O-efficient Algorithms for Processing of Massive Terrain Data*. Korean Advanced Institute of Science and Technology (KAIST), South Korea
I/O-efficient Algorithms for Processing of Massive Terrain Data. Pohang University of Science and Technology (POSTECH), South Korea

2010 *Orthogonal Range Reporting in 3 and Higher Dimensions*. Hong Kong University of Science and Technology, Hong Kong

2009 *Massive Data Algorithmics*. Tsinghua University, China

2008 *Massive Data Algorithmics*. University of Koper, Slovenia
Massive Data Algorithmics. University of Copenhagen, Denmark

2005 *Hydrology Analysis on Massive Terrains*. U.S. Army Topographic Engineering Center, USA
Efficient Processing and Analysis of Massive Dataset. Alexandra Institute, Denmark
Hydrology Analysis on Massive Terrains. U.S. Army Engineer Research and Development Center, Geotechnical and Structures Laboratory, USA

2004 *Implementing External Memory Algorithms and Data Structures*. Munster University, Germany

2003 *Algorithms for Hierarchical Memory: Theory and Practice*. Vilnius University, Lithuania
External Memory Data Structures. Eindhoven-Carleton workshop on Computational Geometry, The Netherlands
Bkd-tree: A Dynamic Scalable kd-Tree. Dagstuhl seminar on Computational Cartography and Spatial Modeling, Germany
Cache-Oblivious Orthogonal Range Searching. Oberwolfach seminar on Efficient Algorithms, Germany
Cache-Oblivious Orthogonal Range Searching. Technical University of Crete, Greece
Cache-Oblivious Orthogonal Range Searching. Bertinoro seminar on Algorithms and Data Structures, Italy
Algorithms for Hierarchical Memory: Theory and Practice. University of California, Santa Barbara, USA
Cache-Oblivious Orthogonal Range Searching. University of California, Irvine
Cache-Oblivious Orthogonal Range Searching. Aalborg University, Denmark
Cache-Oblivious Orthogonal Range Searching. Aarhus University, Denmark

2002 *Cache-Oblivious Priority Queue*. Lawrence Livermore National Laboratory
Cache-Oblivious Priority Queue and Graph Algorithm Applications. Dagstuhl seminar on data structures, Germany

2001 *I/O-efficient Dynamic Planar Point Location*. Aarhus University, Denmark

2000 *On External Memory MST, SSSP and Multi-way Planar Graph Separation*. Oberwolfach seminar on Efficient Algorithms, Germany.
I/O-Efficient Dynamic Planar Point Location. Dagstuhl seminar on data structures, Germany

1999 *Optimal Two-Dimensional Range Searching in External Memory*. Max Planck-Institut for Informatik, Germany

I/O-efficient Dynamic Point Location in Monotone Planar Subdivisions. Dagstuhl seminar on Computational Geometry, Germany
Implementing External-Memory Algorithms using TPIE. Dagstuhl seminar on Computational Geometry, Germany

1998 *I/O-efficient Contour Line Extraction and Planar Graph Blocking*. Dagstuhl seminar on data structures, Germany
Input/Output Efficient Algorithms: Theory and Practice. AT&T Laboratories – Research, USA
Input/Output Efficient Algorithms: Theory and Practice. University of Maryland, College Park, USA
Input/Output Efficient Algorithms: Theory and Practice. University of Waterloo, Canada
Input/Output Efficient Algorithms: Theory and Practice. Princeton University, USA
I/O-Efficient Dynamic Point Location in Monotone Subdivisions. Aarhus Univesity, Denmark
Storing, Searching, and Processing massive Geo-Spatial Data. Brown University, USA

1997 *On Sorting Strings in External Memory*. Aarhus University, Denmark.

1996 *Range Searching and Interval Management in External Memory*. University of Florence, Italy.

1995 *I/O-Efficient Computation*. Carleton University, Canada.
External-Memory Algorithms for Processing Line Segments in Geographic Information Systems. Carleton University, Canada
I/O-Efficient Computation. University of South Australia, Australia

1994 *External-Memory Lower Bounds*. Duke University, USA

1993 *A General Lower Bound on the I/O-Complexity of Comparison-based Algorithms*. Max Planck-Institut for Informatik, Germany

Consulting

2016 Karlsruhe Institute of Technology
2015 NN Markedsdata
2006 & 2006 Birdstep Technology, Seattle.

Postdoctoral Assistants

2013 – Allan G. Jørgensen (Ph.D. Aarhus University)
2015 – 2018 Jesper Sindahl Nielsen (Ph.D. Aarhus University; now at Uber)
2015 – 2017 Frank Staals (Ph.D. Utrecht University; now Post Doc at Utrecht University)
2014 – 2017 Constantinos Tsirogiannis (Ph.D. TU Eindhoven; Now at Teklatech)
2014 – 2015 Wanbin Son (Ph.D. POSTECH; now Post Doc at POSTECH)
2013 – 2015 Zengfeng Huang (Ph.D. Hong Kong University of Science and Technology; now research fellow at University of New South Wales)
2012 – 2014 Zhewei Wei (Ph.D. Hong Kong University of Science and Technology; Now Assistant Professor at Renmin University)
2012 – 2014 Darius Sidlauskas (Ph.D. Aalborg University; now Post Doc at EPFL Lausanne)
2012 – 2013 Hossein Jowhari (Ph.D. Simon Fraser University)
2011 – 2013 Constantinos Tsirogiannis (Ph.D. TU Eindhoven; Now at Teklatech)
2011 – 2013 Wei Yu (Ph.D. Tsinghua University)
2011 – 2013 Cicimol Alexander (Ph.D. University of Leicester; now Post Doc at IFREMER)
2011 – 2012 Lap-Kei Lee (Ph.D. University of Hong Kong; now Post Doc at University of Hong Kong).
2010 – 2012 Elad Verbin (Ph.D. Tel Aviv University)
2010 – 2012 Qin Zhang (Ph.D. Hong Kong University of Science and Technology; now Assistant Professor at Indiana University)
2010 – 2012 Brody Sandel (Ph.D. UC Berkeley; now Assistant Professor at Santa Clara University)
2009 – 2011 Nodari Sitchinava (Ph.D. UC Irvine; now Assistant Professor at University of Hawaii)

2009 – 2010 Payman Afshani (Ph.D. University of Waterloo; now Associate Professor at Aarhus University)
2008 – 2010 Deepak Ajwani (Ph.D. Max-Planck-Institut fur Informatik; Now research scientist at Bell Labs, Dublin)
2008 – 2009 Mohammad Abam (Ph.D. TU Eindhoven: now Assistant Professor at Sarif University of Technology)
2008 – 2009 Peter Hachenberger (Ph.D. Max-Planck-Institut fur Informatik; Now in industry)
2007 – 2009 Srinivas Rao (Ph.D. IMCS, Chennai; now Associate Professor at Seoul National University)
2006 – 2008 Henrik Blunck (Ph.D. Munster University; now Post Doc at Aarhus University)
2005 – 2006 Loukas Georgiadis (Ph.D. Princeton University; now Associate Professor at University of Ioannina)
2004 – 2005 Herman Haverkort (Ph.D. Utrecht University; now Assistant Professor at TU Eindhoven)
2002 Norbert Zeh (Ph.D. Carleton University; now Professor at Dalhousie University)

Teaching

Duke University

2004 I/O-efficient Algorithms (graduate)
2003 Introduction to the Design and Analysis of Algorithms (undergraduate)
2002 Introduction to the Design and Analysis of Algorithms (undergraduate)
2001 I/O-efficient Algorithms (graduate)
Introduction to the Design and Analysis of Algorithms (undergraduate)
2000 The Design and Analysis of Algorithms (graduate)
Introduction to the Design and Analysis of Algorithms (undergraduate)
1999 The Design and Analysis of Algorithms (graduate)
I/O-efficient Algorithms (graduate)
1998 The Design and Analysis of Algorithms (graduate)
Advanced Data Structures (graduate)

1997 Design and Analysis of Algorithms with Applications in Geographic Information Systems (graduate)

Aarhus University

2019 Computational Geometry: Theory and Experimentation (graduate)
2018 Computational Geometry: Theory and Experimentation (graduate)
2017 Computational Geometry: Theory and Experimentation (graduate)
2016 I/O-algorithms (graduate)
2015 I/O-algorithms (graduate)
2014 I/O-algorithms (graduate)
2013 I/O-algorithms (graduate)
2012 I/O-algorithms (graduate)
2011 I/O-algorithms (graduate)
2009 I/O-algorithms (graduate)
2008 I/O-algorithms (graduate)
2007 I/O-algorithms (graduate)
2006 I/O-algorithms (graduate)
Computational Geometry (graduate)
2005 Advanced Data Structures (graduate)
I/O-algorithms (graduate)
2004 Computational Geometry (graduate)

1995 One week courses for high-school students participating Informatics Olympiad
1994 Algorithms and data structures Co-lecturer (undergraduate - 1/4 of the lectures)
One week courses for high-school students participating Informatics Olympiad

Advising

Graduate

2017 – Asger Hautop Drewsen (PhD)
2016 – Svend Svendsen (PhD)
2014 – 2019 Mathias Rav (PhD; now at SCALGO)
2015 – 2018 Yujin Shin (PhD; now at Microsoft)
2012 – 2015 Bryan Wilkinson (PhD – co-advisor; now at Amazon)
2012 – 2015 Jungwoo Yang (PhD; now at SCALGO)
2009 – 2012 Freek van Walderveen (PhD; now at SCALGO)
2008 – 2013 Kasper Larsen (PhD; now Associate Professor at Aarhus University)
2008 – 2014 Morten Revsbaek (PhD; now at SCALGO)
2008 – 2012 Jesper Moeslund Eshøj (PhD – co-advisor; now at Danish Center for Environment and Energy)
2007 – 2012 Lasse Deleuran (PhD; now at Adidas)
2005 – 2009 Thomas Mølhave (PhD; now at SCALGO)
2006 – 2008 Anders Hessellund Jensen (MS)
2007 Morten Revsbaek (MS)
2006 – 2007 Lars Hvam Petersen (MS)
2002 – 2006 Ke (Kevin) Yi (PhD – co-advisor; now Professor at HKUST)
2001 – 2006 Andrew Danner (PhD; now Associate Professor at Swarthmore College)
2001 – 2004 Bryan Holland-Minkley (MS)
1998 – 2003 Laura Toma (PhD; now Professor at Bowdoin College)
1997 – 2002 Octavian Procopiuc (PhD – co-advisor; now at Google)

Undergraduate

2002 Major advisor for 10 Duke students
2002 Advisor for independent research project of Duke student Andrew Chatham (graduated with highest honor and received a honorable mentioning in the CRA 2002 outstanding undergraduate award competition. Now at Google)
2001 Major advisor for 10 Duke students
2000 Advisor for independent research project of Duke student Sha-Mayn Teh (now at Google)

Thesis Committees

2012 Thomas Dueholm Hansen (PhD Aarhus)
2011 Constantinos Tsirogiannis (PhD TU Eindhoven)
2011 Claudio Orlandi (PhD Aarhus)
2010 Peder Dueholm Justesen (PhD Aarhus)
2010 Allan G. Joergensen (PhD Aarhus)
2009 Martin Olsen (PhD Aarhus)
2007 Mohammad Abam (PhD TU Eindhoven)
2007 Kristian Støvring (PhD Aarhus)
2006 Hai Yu (PhD Duke)
2006 Christian Worm Mortensen (PhD ITU)
2004 Vijay Natarajan (PhD Duke)
Herman Haverkort (PhD Utrecht)

2003 Geeta Petrovic (PhD Dartmouth)
2002 Rajiv Wickremesinghe (MS Duke)
Sathish Govindarajan (MS Duke)
2001 Apostol Natsev (PhD Duke)
Cecilia M. Procopiuc (PhD Duke)
Adolfo Rodriguez (MS Duke)
Yusu Wang (MS Duke)
1999 Min Wang (PhD Duke)
Rakesh Barve (PhD Duke

Service

To University of Aarhus

2015 – 2016 Faculty of Science and Technology, Tenure and promotions committee
2014 – 2015 Faculty of Science and Technology, Hiring and promotion processes working group
2014 Aarhus University, Elite researcher recruitment working group
2013 Faculty of Science and Technology, Tenure-track model working group
2012 – 2014 Aarhus University, Research Forum
2012 – 2015 Faculty of Science and Technology, Academic Council
2012 – 2015 Department of Computer Science, Department Forum
2012 Aarhus University, President ("Rektor") application advisory group
2007 Faculty of Science, Professor evaluation committee (Chair)
2007 – 2013 Department of Computer Science, PhD committee
2005 – Department of Computer Science, Research Committee
2005 – 2009 Department of Computer Science, Distinguished Lecture Series committee

To Duke University

2004 Department of Computer Science, Faculty Search Committee
2003 Department of Computer Science, Faculty Search Committee
2002 Department of Computer Science, Faculty Search Committee
2002 Department of Computer Science, Strategic Planning Committee
2001 – 2004 Department of Computer Science, Lab Committee
2000 Department of Computer Science, Colloquia Committee (Chair) and local coordinator of Triangle Distinguished Lecture Series
1999 – 2001 Department of Computer Science, Graduate Admissions Committee
1997 Department of Computer Science, Faculty Search Committee

To the Profession and Society

2018 – Member of board of Videnskabsklubben
2018 – Member of the board of Carlsbergs Mindelegat for Brygger J C Jacobsen
2018 Member of steering committee for H.C. Ørsted 2020 festival
2017 Head of secretariat, The Royal Danish Academy of Science and Letters
2016 – Member of the board of Niels Bohr Foundation
2016 – Chairman of the board of the Aksel Tovborg Jensen Foundation
2016 – Secretary General, The Royal Danish Academy of Science and Letters
2016 –2018 Member of the Danish Academy of Technical Sciences, Science and Engineering project steering committee
2015 – Member of Presidium for Royal Danish Academy of Science and Letters

2015 – 2018 Member of search committee for the The Villum Kann Rasmussen Annual Award for Technical and Scientific Research (VKR Research Award, Chair from 2017)
2015 Member of Royal Danish Academy of Science and Letters Silver Medal committee
2015 Member of Central Denmark Region (Region Midtjylland) growth forum project group on Big Data
2015 – 2017 Member of Digitalization and Big Data Steering Committee of the Danish Academy of Technical Sciences
2014 Member of Steering Committee for National Data Management
2013 – 2019 Member of the Natural Science council of Independent Research Fund Denmark (Vice-Chair from 2015 to 2017 and Chair from 2017 to 2019)
2012 – 2019 Member of Council of European Association of Theoretical Computer Science (EATCS)
2012 Member of evaluation committee for Max-Planck IMPRS for Computer Science
2011 – 2015 Member of Danish Academy of Technical Sciences information technology group steering committee
2011 Member of organizing committee for Royal Danish Academy of Science and Letters Biodiversity in the Silicon Age Symposium
2009 Member of scientific steering committee for National Natural Science Foundation of China and Danish National Research Foundations joint symposium on Information- and Communication Technology
2009 Chair of organizing committee for 25th ACM Symposium on Computational Geometry
2006 – 2010 Member of steering committee for European Symposium on Algorithms (2006-2010) (Chair from 2007)
2005 – 2008 Member of advisory board for Intelligent Sound research project at Technical University of Denmark and Aalborg University
2007 – 2017 Member of organization committee for annual MADALGO summer school
2004 – Member of steering committee for Scandinavian Workshop on Algorithm Theory
2004 – 2016 Member of steering committee for Workshop on Algorithm Engineering and Experiments
2004 Review Panel member, US National Science Foundation
2002 Review Panel member, US National Science Foundation
2001 Review Panel member, US National Science Foundation
2001 Site Visit Panel member, US National Science Foundation
2000 Review Panel member, US National Science Foundation

Additionally, I have served as reviewer for numerous journals and conferences, as well as reviewed proposal for several European and Asian Research Agencies.

During my time as an undergraduate and graduate student I was active in the local and university level student council, and served as Chairman of the Student Council ("Studenterrådet") at Aarhus University for a couple of years.

Professional Affiliations

2001 – IEEE Computer Society
1996 – Association for Computer Machinery (ACM), including Special Interest Groups on Algorithms and Computation Theory (SIGACT), on Management of Data (SIGMOD) and on spatial information (SIGSPATIAL); Distinguished Scientist member since 2009, Fellow since 2012
1993 – European Association of Theoretical Computer Scientists