Ali Pınar

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Research Interests

Combinatorial scientific computing, combinatorial algorithms, parallel computing, numerical algorithms, scientific computing, electric power systems, data engineering.

Education

1997–2001 Ph.D. in Computer Science with the option of Computational Science and Engineering,
University of Illinois at Urbana-Champaign (UIUC),
Thesis title: "Combinatorial Algorithms in Scientific Computing,"
Thesis co-advisors: Prof. Michael Heath and Dr. Bruce Hendrickson.

1994–1996 M.Sc. in Computer Engineering and Information Science,
Bilkent University, Ankara, Turkey,
Thesis title: "Decomposing Linear Programs for Parallel Solution,"
Thesis advisor: Prof. Cevdet Aykanat.

1990–1994 B.Sc. in Computer Engineering and Information Science,
Bilkent University, Ankara, Turkey.

Awards and Achievements

2005 – Principal investigator of the project
"Advanced Computational Tools for Electric Power Systems."
funded under the "Laboratory Directed Research Program,"

2001–2004 Principal investigator of the project
"Combinatorial Algorithms and Scientific Computing."
funded under the "Laboratory Directed Research Program,"

2000 "Outstanding Graduate Student Service Award,"
Dept. of Computer Science, U. of Illinois at Urbana-Champaign.

1997 Fellowship for Ph.D. studies,
Scientific and Technical Research Council of Turkey (TÜBİTAK).

1990–94 Full Scholarship for B.Sc. studies to cover all educational expenses,
Bilkent University, Turkey.

Experience

May, 2004– Staff Scientist,
Lawrence Berkeley National Laboratory,
Principal investigator for the project
"Advanced Computational Tools for Electric Power Systems,"

part of Laboratory Directed Research and Development Program,
Principal investigator for the project
"Combinatorial Algorithms in Scientific Computing,"
part of Laboratory Directed Research and Development Program,
Participant in the project "Terascale Optimal PDE Simulations,"
part of DOE SciDac program.

Oct, 2001 – May, 2004 Postdoctoral Researcher,
Lawrence Berkeley National Laboratory,
Principal investigator for the project
"Combinatorial Algorithms in Scientific Computing,"
part of Laboratory Directed Research and Development Program,
Participant in the project "Terascale Optimal PDE Simulations,"
part of DOE SciDac program.

Summers 1999, 2000 Visiting Researcher,
Sandia National Laboratories,
Designed and implemented load balancing and communication algorithms
for adaptive computation.

June, 1999–2001 Research Assistant,
Computational Science and Engineering Program, UIUC,
Supported by Sandia National Laboratories,
Supervisors: Prof. Michael Heath (UIUC),
Dr. Bruce Hendrickson (Sandia)
Designed and implemented load balancing and communication algorithms
for adaptive computation.

Jan., 1998– May, 1999 Research Assistant,
Center of Simulation of Advanced Rockets, UIUC,
Supervisor: Prof. Michael Heath,
Developed data structures and ordering techniques to improve
memory-performance of sparse matrix-vector multiplication.

Aug., 1997–Dec., 1997 Research Assistant,
Dept. of Computer Science, UIUC,
Supervisor: Prof. C.L. Liu,
Devised techniques for input sequence compaction for efficient
power estimation of combinational circuits.

Sep., 1994–July 1997 Teaching and Research Assistant,
Dept. of Computer Engineering and Information Science,
Bilkent University, Ankara,Turkey,

Supervisor: Prof. Cevdet Aykanat,
Designed hypergraph models for sparse matrices for permutation to block-angular form,
Developed algorithms for optimal one-dimensional decomposition,
Teaching Assistant for Algorithms I, Program Verification, and
Combinatorics and Graph Theory.

Publications

1. A. Pınar, T. Tao, and H. Ferhatosmanoglu, "Compressing Bitmap Indices by Data Reor-

ganization," to appear in the Proc. *International Conference on Data Engineering*.

2. A. Pınar and C. Aykanat, "Fast Optimal Load Balancing Algorithms for 1D Partitioning," *Journal of Parallel and Distributed Computing*, Vol. 64, pages:974–996, 2004.

3. V. Vassilevska and A. Pınar, "Finding Nonoverlapping Substructures of a Sparse Matrix," in preparation, to be submitted to *Electronic Transactions on Numerical Algorithms*.

4. C. Aykanat, A. Pınar, and Ü. Çatalyürek, "Permuting Sparse Rectangular Matrices into Block-Diagonal Form," *SIAM Journal on Scientific Computing*, Vol. 25, No. 6, pages: 1860–1879, 2004.

5. A. Pınar and B. Hendrickson, "Interprocessor Communication with Limited Memory," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 15, No. 7, pages: 606–616, 2004.

6. A. Pınar and B. Hendrickson, "Combinatorial Parallel and Scientific Computing," in preparation, to appear in Proceedings of SIAM Conference on Parallel and Scientific Computing.

7. A. Pınar, "High Performance Combinatorial Algorithms," Technical Report: LBNL-53989, Lawrence Berkeley National Laboratory, Berkeley, CA.

8. A. Pınar and B. Hendrickson, "Improving Load Balance with Flexibly Assignable Tasks," submitted to *IEEE Transactions on Parallel and Distributed Systems*.

9. A. Pınar, M. Singh, and E. G. Ng, "Nested Dissection Orderings for LU Factorization of Unsymmetric Matrices with Static Pivoting," extended abstract in *Proc. SIAM Workshop on Combinatorial Scientific Computing*, full version in preparation.

10. E. Chow, A. Pınar, and A. Pothen, "Combinatorial Techniques for Constructing Sparse Null-space Bases," in preparation.

11. E. Chow, A. Pınar, and A. Pothen, "The Nice Basis Problem," in preparation.

12. C. Aykanat, A. Pınar, and Ü. Çatalyürek, "Performance Comparison of Graph and Hypergraph models for Permutation to Block-diagonal Form," in preparation.

13. L. Fleischer, B. Hendrickson and A. Pınar, "A Divide-and-Conquer Algorithm for Identifying Strongly Connected Components," submitted to *Networks*.

14. A. Pınar and C.L. Liu, "Compacting Sequences with Invariant Transition Frequencies," *ACM Trans. Design Automation of Electronic Systems*, Volume:8, No:2, pages 214 – 221.

15. A. Pınar and B. Hendrickson, "Exploiting Flexibly Assignable Work to Improve Load Balance," *Proc. ACM 14th Symp. Parallel Algorithms and Architectures (SPAA) 2002* pages: 155-163.

16. A. Pınar and B. Hendrickson, "Graph Partitioning for Complex Objectives," *Proc. 15th International Parallel and Distributed Processing Symp. (IPDPS), IEEE, 2001.*

17. A. Pınar and B. Hendrickson, "Communication Support for Adaptive Computation," in *Proc. SIAM Conf. on Parallel Processing for Scientific Computing 2001.*

18. A. Pınar and B. Hendrickson, "Interprocessor Communication with Memory Constraints," *Proc. ACM Symp. Parallel Algorithms and Architectures (SPAA) 2000*, pages 39–45.

19. L. Fleischer, B. Hendrickson, and A. Pınar, "On Identifying Strongly Connected Components in Parallel," *Lecture Notes in Computer Science*, Vol. 1586, pages 505–511.

20. A. Pınar and M. Heath, "Improving Performance of Sparse Matrix-Vector Multiplication," *Proc. Supercomputing 99*, 1999.

21. A. Pınar and C.L. Liu, "Power Invariant Vector Sequence Compaction," *Proc. 1998 IEEE/ACM International Conf. Computer Aided Design*, pages 473–476, 1998.

22. A. Pınar and C. Aykanat, "Sparse Matrix Decomposition with Optimal Load Balancing," *Proc. International Conf. High Performance Computing (HiPC) 97*, pages 224–229, 1997.

23. A. Pınar and C. Aykanat, "An Effective Model to Decompose Linear Programs for Parallel Solution," *Lecture Notes in Computer Science*, Vol. 1184, pages 592–601.

24. A. Pınar, Ü. Çatalyürek, C. Aykanat, and M. Pınar, "Decomposing Linear Programs for Parallel Solution," *Lecture Notes in Computer Science*, Vol. 1041, pages 473–482.

25. A. Pınar, "A New Genetic Algorithm for Hypergraph Partitioning," *Proc. Turkish Artificial Intelligence and Neural Networks Symp. (TAINN) 96*, pages 167–176, 1996.

26. A. Pınar and U. Çetintemel, "Wide-Area Distributed Selective Dissemination of Information," *Proc. Tenth International Symp. on Computer and Information Sciences (ISCIS)* , pages 281–288, 1995.

Conference Presentations and Invited Talks

1. "Alternative Models for Load Balanicing," *SIAM Conf. on Parallel Processing for Scientific Computing 2001*, San Francisco, California, February, 2004.

2. "Nested Dissection Orderings for LU Factorization with Static Pivoting," *SIAM Workshop on Combinatorial Scientific Computing*, San Francisco, California, February, 2004.

3. "Combinatorial Techniques for Constructing Sparse Null-space Bases," SIAM Conference on Applied Linear Algebra," Williamsburg, VA, July 2003.

4. "The Nice Basis Problem," Bay Area Scientific Computing Day, Stanford University, March,2003. Also MCS Divisional Seminar, Argonne National Laboratory, May, 2003.

5. "Exploiting Flexibly Assignable Work to Improve Load Balance," SIAM 20th Anniversary and 2002 Annual Meeting, Philadelphia, Pennsylvania, July, 2002.

6. "Partitioning for Complex Objectives," International Parallel and Distributed Processing Symp., San Francisco, California, April, 2001.

7. "Combinatorial Algorithms for Adaptive Computation," NERSC Scientific Computing Seminar, Berkeley, California, April, 2001.

8. "Communication Support for Adaptive Computation," *SIAM Conf. on Parallel Processing for Scientific Computing 2001*, Portsmouth, Virginia, March, 2001.

9. "Interprocessor Communication with Memory Constraints," *ACM Symp. on Parallel Algorithms and Architectures (SPAA)*, Bar Harbor, Maine, July, 2000.

10. "On Identifying Strongly Connected Components in Parallel," *International Parallel and Distributed Processing Symp. (IPDPS)*, Cancun, Mexico, May, 2000.

11. "Improving Performance of Matrix-Vector Multiplication," *Supercomputing 99*, Portland, Oregon, November, 1999.

12. "Power Invariant Vector Sequence Compaction," *International Conf. on Computer Aided Design*, San Jose, California, November, 1998.

13. "An Effective Graph Model to Decompose Linear Programs for Parallel Solution," *PARA96, Workshop on Applied Parallel Computing in Industrial Problems and Optimization*, Lyngby, Denmark, August, 1996.

14. "A New Genetic Algorithm for Hypergraph Partitioning," *Artificial Intelligence and Neural Network Symp.*, Istanbul, Turkey, June, 1996.

15. "Wide-Area Distributed Selective Dissemination of Information," *International Symp. on Computer and Information Systems*, Izmir, Turkey, November, 1995.

Services and Memberships

- Program Committee Member, 19th International Symposium on Computer and Information Sciences, Antalya, Turkey, 2004.

- Minisymposium Organizer, "Combinatorial Algorithms and Parallel Computing," SIAM Conference on Parallel Computing and Scientific Computing, San Francisco, California, February, 2004.

- Minisymposium Organizer, "Combinatorial Algorithms in Scientific Computing," SIAM Conference on Computational Science and Engineering, San Diego, California, February, 2003.

- Reviewer, *SIAM Journal on Discrete Mathematics, SIAM Review, IEEE T. Parallel and Distributed Systems*, ACM Transactions on Mathematical Software, *Mathematical and Computer Modelling*, Journal of Paralle and Distributed Computing, Electronic Transactions on Numerical Analysis, and Parallel Algorithms and Applications.

- Reviewer, *International Parallel and Distributed Processing Symposium* (IPDPS 04) and *International Conference on High Performance Computing* (HiPC 97).

- Member, Graduate Study Committee, Dept. of Computer Science, UIUC, 2000-2001.

- Member, Fellowships, Assistantships and Admissions Committee, Dept. of Computer Science, UIUC, 1999–2000.

- Elected President of Faculty of Engineering Student Board, Bilkent University, Turkey (1992–1993).

- Elected Secretary of Faculty of Engineering Student Board, Bilkent University, Turkey (1991–1992).

- Secretary, IEEE Bilkent Student Branch, Bilkent University, Turkey (1991–1992).
- Member, SIAM, ACM.
- Founding member, Alumni Association of Istanbul High School of Sciences.

References

References are available upon request.