Arif Khan

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Objective & Research Interest

My research interest includes parallel & high performance computing (HPC), combinatorial problems, graph algorithms and their applications in Big Data Analysis. My objective is to incorporate HPC techniques to analyze large-scale problems in order to solve useful real life applications.

Education

2011-2017 PhD in Computer Science
Purdue University, West Lafayette, IN, USA

2008-2010 MS in Computer Science
University of Florida, Gainesville, FL, USA

2001-2006 BS in Computer Science
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Research Experience

Aug 2017 -
To date Scientist
Pacific Northwest National Laboratories (PNNL), Richland, WA

- Member of the Data Sciences group at the ACMD Division.

May 2014 -
Aug 2014 Summer PhD Intern
PCL, Intel Labs, Santa Clara, CA

- Member of the HPC group at Parallel Computing Labs.
- Worked on designing and implementing parallel b-Matching algorithm optimized for Intel specific architecture Xeon and Xeon Phi.

May 2013 -
Aug 2013 Summer PhD Intern
Pacific Northwest National Laboratories (PNNL), Richland, WA

- Member of the HPC group.
- Worked on designing and implementing distributed memory algorithm for Network Alignment problem to solve large instances.

May 2012 -
Aug 2012 Summer PhD Intern
Pacific Northwest National Laboratories (PNNL), Richland, WA

- Member of the HPC group.
- Worked on designing and implementing shared memory parallel algorithm for Network Alignment problem for faster solution.

May 2011 -
Aug 2011 Summer PhD Intern
SANDIA National Laboratories, Albuquerque, NM

- Member of the Trillions developers group.
- Developed the multi-threaded maximum cardinality-matching algorithm and integrated it to the Trilinos – Isorropia package.

Jan 2011 -
May 2017 Research Assistant
Dept of Computer Science, Purdue University, West Lafayette, IN

- Research Assistant to Prof. Alex Pothen in HPC Group.

Selected Publications

- Kelsey Maass, Arun Sathanur, **Arif Khan** & Robert Rallo. *Street-level Travel-time Estimation via Aggregated Uber Data.* SIAM Workshop on Combinatorial Scientific Computing (SIAM CSC), 2020.

- **Arif Khan**, Mahantesh Halappanavar, Tobias Hagge, Karol Kowalski, Alex Pothen & Sriram Krishnamoorthy. *Mapping Arbitrarily Sparse Two-body Interactions on One-dimensional Quantum Circuits.* IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC), 2019

- Arun Sathanur, Vinay Amatya, **Arif Khan**, Robert Rallo & Kelsey Maass. *Graph Analytics and Optimization Methods for Insights from the Uber Movement Data.* ACM The Emerging Interest Group on Smart Cities and Communities (ACM SCC), 2019

- S M Ferdous, Alex Pothen & **Arif Khan**. *New Approximation Algorithms for Minimum Weighted Edge Cover.* SIAM Workshop on Combinatorial Scientific Computing (SIAM CSC), 2018.

- **Arif Khan**, Krzysztof Choromanski, Alex Pothen, S M Ferdous, Mahantesh Halappanavar & Antonino Tumeo. *Adaptive Anonymization of Data using b-Edge Cover.* The International Conference for High Performance computing, Network, Storage and Analysis (Supercomputing), 2018.

- S M Ferdous, Alex Pothen & **Arif Khan**. *New Approximation Algorithms for Minimum Weighted Edge Cover.* SIAM Workshop on Combinatorial Scientific Computing (SIAM CSC), 2018.

- **Arif Khan**, Alex Pothen, & S M Ferdous. *Parallel Algorithms through Approximation: b-Edge Cover.* IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2017.

- Sayan Ghosh, Mahantesh Halappanavar, Antonino Tumeo, Ananth Kalyanaraman, Hao Lu, Daniel Chavarria-Miranda, **Arif Khan** & Assefaw Gebremedhin. *Distributed Louvain Algorithm for Graph Community Detection.* IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2017.

- **Arif Khan**, Alex Pothen, Mostofa Patwary, Nadathur Satish, Narayanan Sunderam, Mahantesh Halappanavar & Pradeep Dubey. *Computing b-Matchings to scale on distributed memory multiprocessors by approximation.* The International Conference for High Performance computing, Network, Storage and Analysis (Supercomputing), 2016.

- **Arif Khan**, Alex Pothen. *A new $3/2-$approximation algorithm for $b-$Edge Cover Problem.* SIAM Workshop on Combinatorial Scientific Computing (SIAM CSC), 2016.

- **Arif Khan**, Alex Pothen, Mostofa Patwary, Nadathur Satish, Narayanan Sunderam, Fredrik Manne, Mahantesh Halappanavar & Pradeep Dubey. *Efficient approximation algorithms for weighted b-Matching.* SIAM Journal on Scientific Computing (SIAM SISC), 2015.

- Mahantesh Halappanavar, Alex Pothen, Ariful Azad, Fredrik Manne, Johannes Langguth & **Arif Khan**, *Codesign Lessons Learned from Implementing Graph Matching on Multithreaded Architectures.* IEEE Computer Magazine, 2015.

- Ariful Azad, **Arif Khan**, Bartek Rajwa, Saumyadipta Pyne & Alex Pothen. *Classifying Immunophenotypes with Templates from Flow Cytometry.* ACM Conference of Bioinformatics, Computational Biology and Biomedical Informatics (ACM BCB), 2013.

- **Arif Khan**, David Gleich, Mahantesh Halappanavar & Alex Pothen. *A Multithreaded Algorithm for Network Alignment via Approximate Matching.* The International Conference for High Performance computing, Network, Storage and Analysis (Supercomputing), 2012.

- Ariful Azad, Mahantesh Halappanavar, Sivasankaran Rajamanickam, Erik G. Boman, **Arif Khan** & Alex Pothen. *Multithreaded Algorithms for Maximum Matching in Bipartite Graphs.* IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2012.

- **Arif Khan** & Markus Schneider. *Topological Reasoning between Complex Regions in Databases with Frequent Updates.* ACM International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS), 2010.

- Tao Chen, **Arif Khan**, Markus Schneider & Ganesh Viswanathan. *iBLOB: Complex Object Management in Databases Through Intelligent BLOB*. International Conference on Objects and Databases (ICOODB), 2010.

- Markus Schneider, Shen-Shyang Ho, Tao Chen, **Arif Khan**, W. Timothy Liu, Wenqing Tang & Ganesh Viswanathan. *Moving Object Database Technology for Ad-Hoc Querying and Satellite Data Retrieval of Dynamic Atmospheric Events*. NASA Earth Science Technology Forum (ESTF), 2010.

Awards & Honors

- John Rice Fellowship, Distinguished CS Graduate Research, Purdue University, 2017
- ACM Student Research Award, 2014, 3rd Place, Supercomputing 2014.
- University Merit Award, 2008-2010, University of Florida.
- Dean's list Award, 2002-2006, BUET, Bangladesh.

Professional Serivces

- **PC Member**: IEEE International Workshop on High Performance Computational Biology (HiComb), 2020

- **Organizer**: SIAM Minisymposium on the Intersection of Machine Learning and Graph Algorithms (SIAM CSE), 2019.

- **PC Member**: Workshop on Irregular Applications: Architectures and Algorithms (IA^3), 2018.

- **Referee**: ACM Transactions on Parallel Computing (TOPC), 2019

- **PC Member**: International Conference on High Performance Computing (HiPC), 2018.

- **Referee**: Journal of Parallel and Distributed Computing (JPDC), 2017-2018

- **Referee**: IEEE Transactions on Parallel and Distributed Systems (TPDS), 2017-2018.

Professional Membership

- Association for Computing Machinery (ACM)
- Society for Industrial and Applied Mathematics (SIAM)
- The Institute of Electrical and Electronics Engineers (IEEE)

References

Name	Alex Pothen	**Name**	John Feo
Position	Professor	**Position**	Manager
Department	Computer Science	**Department**	Advanced Comput, Math & Data
Institution	Purdue University	**Institution**	Pacific Northwest National Lab
Contact	apothen@purdue.edu	**Contact**	John.Feo@pnnl.gov