

CURRICULUM VITAE

S M Ferdous

Personal Information

Place and Date of Birth: Dhaka, Bangladesh | 25 December 1988

Address: 2550 Yeager Road, Apt 2-5, West Lafayette, In-47906, USA

Phone: +1(765)-409-8632

Email: sm.ferdous@pnnl.gov; ferdous.csebuett@gmail.com

🏠 : <https://smferdous1.github.io> | **in** : <http://bit.ly/linkedin-smf> | **g** : <http://bit.ly/scholar-smf>

Professional Appointments

Oct'23 – Current **Data Scientist**

Data Science and Machine Intelligence Group
Pacific Northwest National Lab
WA, USA

Jun'22 – Oct'23 **Pauling Postdoc Fellow**

Data Science and Machine Intelligence Group
Pacific Northwest National Lab
WA, USA

2022(Jan – Jun) **Post-Doctoral Research Associate**

Department of Computer Science
School of Science
Purdue University, USA

2016 – 2021 **Graduate Research Assistant**

Department of Computer Science
School of Science
Purdue University, USA.

2015 – 2016 **Ross Fellow**

Purdue Graduate School
Purdue University
IN, USA.

2021(Jun – Aug) **PhD Intern**

Data Science and Machine Intelligence Group
Pacific Northwest National Lab
WA, USA.

- 2019(Jun – Aug) **PhD Intern**
 ENSA Group
 Nokia Bell Labs
 NJ, USA.
- 2017(May – Aug) **PhD Intern**
 Data Science and Machine Intelligence Group
 Pacific Northwest National Lab
 WA, USA.
- 2015(Mar – Jul) **Assistant Professor**
 Department of Computer Science and Engineering
 Ahsanullah Univ. of Science and Technology
 Dhaka, Bangladesh.
- 2011 – 2015 **Lecturer**
 Department of Computer Science and Engineering
 Ahsanullah Univ. of Science and Technology
 Dhaka, Bangladesh.

Education

- 2015 – 2021 **PhD in Computer Science**, Purdue University, West Lafayette, Indiana
Thesis: “Algorithms for degree-constrained subgraphs and applications”
Advisor: Prof. Dr. Alex Pothen | *GPA*: 3.93/4.00.
- 2011 – 2014 **MSc Engg. in Computer Science and Engineering**
 Bangladesh University of Engineering and Technology (BUET)
Thesis: “Practically Efficient Algorithms for Minimum String Cover and Minimum Common String Partition”
Advisor: Prof. Dr. M. Sohel Rahman | *GPA*: 3.33/4.00.
- 2006 – 2011 **BSc Engg. in Computer Science and Engineering**, BUET
 9/138, *Degree with Honours* | *GPA*: 3.89/4.00.


Fellowships

- 2020 – 2021 **John R. Rice Fellowship** for Scientific Computing, Department of Computer Science, Purdue University.
- 2015 – 2016 **Ross Fellowship** for incoming graduate student.
- 2006 – 2011 **Dean’s list and merit scholarship** in each of the four academic years in undergrad for excellent academic results.

Awards & Honors

- 2021 **Selected for participation** in week long *ARGONNE TRAINING PROGRAM ON EXTREME-SCALE COMPUTING (ATPESC)* 2021.
- 2018 **Travel grant** for attending SIAM Combinatorial Scientific Computing Workshop in Bergen, Norway.
- 2017 **Third best prize** on SIAM Computational Science and Engineering student poster competition at Purdue University.
- 2016 **Travel and accommodation grant** for attending Week long SAMSI summer school on optimization at Research Triangle Park, NC.
- 2008 **Tenth among 50 teams** in ACM Inter Collegiate Programming Contest Regional Dhaka Site.

Publications

Full list in my Google Scholar:  : <http://bit.ly/scholar-smf>

Work In Progress

- 2023 **SM Ferdous**, Bhargav Samineni, Alex Pothén, Mahantesh Halappanavar, and Bala Krishnamoorthy. *Streaming Algorithms for Weighted k -Disjoint Matchings*. 2023. arXiv: [2311.02073](https://arxiv.org/abs/2311.02073) [cs.DS].

Journals

- 2021 Seher Acer, Ariful Azad, Erik G. Boman, Aydın Buluç, Karen D. Devine, **SM Ferdous**, Nitin Gawande, Sayan Ghosh, Mahantesh Halppanavar, Ananth Kalyanaraman, Arif Khan, Marco Minutoli, Alex Pothén, Sivasankaran Rajamanickam, Oguz Selvitopi, Nathan R. Tallent, and Antonino Tumeo. “EXAGRAPH: Graph and Combinatorial Methods for Enabling Exascale Applications”. In: *The International Journal of High Performance Computing Applications* (2021), p. 10943420211029299. DOI: [10.1177/10943420211029299](https://doi.org/10.1177/10943420211029299).
- 2019 Alex Pothén, **SM Ferdous**, and Fredrik Manne. “Approximation algorithms in combinatorial scientific computing”. In: *Acta Numerica* 28 (2019), pp. 541–633. DOI: [10.1017/S0962492919000035](https://doi.org/10.1017/S0962492919000035).
- 2017 **SM Ferdous** and M Sohel Rahman. “Solving the Minimum Common String Partition Problem with the Help of Ants”. In: *Math. Comput. Sci.* 11.2 (2017), pp. 233–249. DOI: [10.1007/s11786-017-0293-5](https://doi.org/10.1007/s11786-017-0293-5).
- 2015 **SM Ferdous** and M. Sohel Rahman. “An Integer Programming Formulation of the Minimum Common String Partition Problem”. In: *PLOS ONE* 10.7 (July 2015), pp. 1–16. DOI: [10.1371/journal.pone.0130266](https://doi.org/10.1371/journal.pone.0130266).

- 2011 Mustafizur Rahman, **SM Ferdous**, Syed Ishtiaque Ahmed, and Anika Anwar. “Speech development of autistic children by interactive computer games”. In: *Interactive Technology and Smart Education 8.4* (2011), pp. 208–223. DOI: [10.1108/17415651111189450](https://doi.org/10.1108/17415651111189450).

Conference proceedings

- 2024 **SM Ferdous**, Reece Neff, Bo Peng, Salman Shuvo, Marco Minutoli, Sayak Mukherjee, Karol Kowalski, Michela Becchi, and Mahantesh Halappanavar. “Picasso: Memory-Efficient Graph Coloring Using Palettes With Applications in Quantum Computing”. In: *arXiv preprint arXiv:2401.06713* (2024). Accepted by IPDPS 2024
- 2023 Lizhi Xiang, Arif Khan, **SM Ferdous**, Sr Aravind, and Mahantesh Halappanavar. “CuAlign: Scalable Network Alignment on GPU Accelerators”. In: SC-W ’23. Denver, CO, USA: Association for Computing Machinery, 2023, pp. 747–755. ISBN: 9798400707858. DOI: [10.1145/3624062.3625129](https://doi.org/10.1145/3624062.3625129). URL: <https://doi.org/10.1145/3624062.3625129>
- 2023 Pasqua D’Ámbra, Fabio Durastante, **SM Ferdous**, Salvatore Filippone, Mahantesh Halappanavar, and Alex Pothén. “AMG Preconditioners based on parallel hybrid coarsening exploiting multi-objective graph matching”. In: *31st Euromicro International Conference on Parallel, Distributed and Network-based Processing, PDP 2023, Naples, Italy, March 1-3, 2023*. 2023
- 2021 **SM Ferdous**, Alex Pothén, Arif Khan, Ajay Panyala, and Mahantesh Halappanavar. “A parallel approximation algorithm for submodular b -matching”. In: *Proceedings of the First SIAM Conference on Applied and Computational Discrete Algorithms (ACDA)*. SIAM, 2021. DOI: [10.1137/1.9781611976830.5](https://doi.org/10.1137/1.9781611976830.5).
- 2021 Beomyeol Jeon, **SM Ferdous**, Muntasir Raihan Rahman, and Anwar Walid. *Privacy-preserving Decentralized Aggregation for Federated Learning*. 2021. DOI: [10.1109/INFOCOMWKSHP51825.2021.9484437](https://doi.org/10.1109/INFOCOMWKSHP51825.2021.9484437).
- 2018 Arif Khan, Krzysztof Choromanski, Alex Pothén, **SM Ferdous**, Mahantesh Halappanavar, and Antonino Tumeo. “Adaptive anonymization of data using b -edge cover”. In: *SC18: International Conference for High Performance Computing, Networking, Storage and Analysis*. IEEE. 2018, pp. 743–753. DOI: [10.5555/3291656.3291735](https://doi.org/10.5555/3291656.3291735).
- 2018 Arif Khan, Alex Pothén, and **SM Ferdous**. “Parallel algorithms through approximation: b -edge cover”. In: *2018 IEEE International Parallel and Distributed Processing Symposium, IPDPS 2018, Vancouver, BC, Canada, May 21-25, 2018*. IEEE Computer Society, 2018, pp. 22–33. DOI: [10.1109/IPDPS.2018.00013](https://doi.org/10.1109/IPDPS.2018.00013).

- 2018 **SM Ferdous**, Alex Pothén, and Arif Khan. “New Approximation Algorithms for Minimum Weighted Edge Cover”. In: *Proceedings of the Eighth SIAM Workshop on Combinatorial Scientific Computing, CSC 2018, Bergen, Norway, June 6-8, 2018*. SIAM, 2018, pp. 97–108. DOI: [10.1137/1.9781611975215.10](https://doi.org/10.1137/1.9781611975215.10).
- 2016 **SM Ferdous**, Md Mustafizur Rahman, and Mahmuda Naznin. “Finding network connectivity failure in a Wireless Sensor Network”. In: *2016 Wireless Days (WD)*. IEEE. 2016, pp. 1–6. DOI: [10.1109/WD.2016.7461522](https://doi.org/10.1109/WD.2016.7461522).
- 2015 **SM Ferdous** and M Sohel Rahman. “A metaheuristic approach for application partitioning in Mobile System”. In: *2015 International Conference on Networking Systems and Security (NSysS)*. IEEE. 2015. DOI: [10.1109/NSysS.2015.7043520](https://doi.org/10.1109/NSysS.2015.7043520).
- 2013 **SM Ferdous** and M Sohel Rahman. “Solving the Minimum Common String Partition Problem with the Help of Ants”. In: *Advances in Swarm Intelligence, 4th International Conference, ICSI 2013*. Springer, 2013, pp. 306–313. DOI: [10.1007/978-3-642-38703-6_36](https://doi.org/10.1007/978-3-642-38703-6_36).
- 2012 **SM Ferdous**, Anindya Das, M Sohel Rahman, and Md Mustafizur Rahman. “An Ant Colony Optimization approach to solve the minimum string cover problem”. In: *2012 International Conference on Informatics, Electronics & Vision (ICIEV)*. IEEE. 2012, pp. 741–746. DOI: [10.1109/ICIEV.2012.6317422](https://doi.org/10.1109/ICIEV.2012.6317422).
- 2011 Mirfat Akter Sharmin, Md Mizanur Rahman, Syed Ishtiaque Ahmed, Md Mustafizur Rahman, and **SM Ferdous**. “Teaching intelligible speech to the autistic children by interactive computer games”. In: *Proceedings of the 2011 ACM Symposium on Applied Computing*. ACM. 2011, pp. 1208–1209. DOI: [10.1145/1982185.1982450](https://doi.org/10.1145/1982185.1982450).
- 2010 Anika Anwar, Md Mustafizur Rahman, **SM Ferdous**, Samiul Alam Anik, and Syed Ishtiaque Ahmed. “A computer game based approach for increasing fluency in the speech of the autistic children”. In: *2011 IEEE 11th International Conference on Advanced Learning Technologies*. IEEE. 2011, pp. 17–18. DOI: [10.1109/ICALT.2011.13](https://doi.org/10.1109/ICALT.2011.13).
- 2010 Md Mustafizur Rahman, **SM Ferdous**, and Syed Ishtiaque Ahmed. “Increasing intelligibility in the speech of the autistic children by an interactive computer game”. In: *2010 IEEE International Symposium on Multimedia*. IEEE. 2010, pp. 383–387. DOI: [10.1109/ISM.2010.64](https://doi.org/10.1109/ISM.2010.64)

Technical posters

- 2020 **SM Ferdous** and Alex Pothén. “Assignment using Lagrangian relaxation and application in ordering sparse matrices”. Presented in SIAM CSC 2020, Seattle, WA. 2020.
- 2016 **SM Ferdous** and Alex Pothén. “On bounding the weight of b-matching on graphs”. Presented in SIAM CSC 2016, Albuquerque, NM. 2016.

Technical talks

- 2021 **SM Ferdous** and Alex Pothen. “Locality Matters! Efficient algorithms for submodular b -matching”. Presented in SIAM CSE 2021, Happened virtually. 2021.
- 2019 **SM Ferdous** and Alex Pothen. “Efficient Algorithms for Degree Constrained Subgraphs with Applications”. Presented in SIAM CSE 2019, Spokane, WA. 2019.
- 2018 **SM Ferdous** and Alex Pothen. “New Approximation Algorithms for Minimum Weight Edge Cover”. Presented in SIAM AN 2018, Portland, OR. 2018

Courses and Projects during PhD

Selected courses

• Statistical Machine Learning • Algorithm Design, Analysis and Implementation • Computational Methods in Optimization • Mathematical Toolkit for Computer Science • Data Communication and Computer Networks • Parallel Computing • Quantum Computation and Information • Reinforcement Learning • Approximation Algorithm in Action.

Selected projects

- Spr. 2018* **Implementing Grover’s search**
 Grover’s search is one of the most influential quantum algorithms. In Spring 2018, I completed a Quantum Computation course offered by *Prof. Sabre Kais*. As a class project, I implemented Grover’s search in IBM QISKIT. I tested my implementation using 6 Qubits in IBM Quantum simulator.
- Spr. 2017* **On bounding the weight of b -matching problem**
 In this project, I investigate Lagrangian-relaxation based upper bounds for the maximum weight b -matching problem. The problem is formulated as an integer program, and then the relaxed dual problem is solved using subgradient methods to compute the upper bound. Since the method may not find a feasible b -matching, a simple heuristic is presented to find feasible solutions from the dual optimal variables. Preliminary experiments show that the method generates bounds that are close to bounds obtained from a linear programming based relaxation, but could be faster than the latter by an order of magnitude.
- Fall 2015* **Modeling Air Travel Demand between two cities**
 The goal of this team project was to model the air travel demand between any two cities, based on the socio-technical factors, using machine learning techniques. The demand was treated as a categorical value. We picked 30 major US airports and collected demand data between two airports for the last 10 years. we considered publicly available such as population of the cities, average income of the cities, distance between two airports, airport category and so on. Using SVM as learning algorithm, we were able to achieve 72% test accuracy.

Others

Certifications

- Jun 2012* Algorithms: Design and Analysis, Part 1, Stanford University, Coursera (earned 87.8%)
- Aug 2012* Machine Learning, Stanford University, Coursera (earned 97.3%)

<i>Dec 2012</i>	Algorithms: Design and Analysis, Part 2, Stanford University, Coursera (earned 82.5%)
<i>Mar 2016</i>	Approximation Algorithms Part I, Ecole normale superieure, Coursera (earned 96%)

Review Services

- Journal Reviewer: PLoS ONE, ACM TOPC, IEEE TPDPS, and Springer JOCO.
- Conference Committee Member: IPDPS 2024
- Conference sub-reviewer: SIAM ACDA 2021, SIAM ACDA 2023, SRDS 2022, Symposium of Experimental Algorithm (SEA) 2022, and WALCOM 2019.

Community Services

<i>2018 – 2019</i>	Served as General Secretary , Bangladesh Students association, Purdue University.
<i>2017 – 2018</i>	Served as Web Master , Bangladesh Students association, Purdue University.