Zeyar Aung

Ph.D. (Comp. Sc.), B.Comp.Sc. (Hons)

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Research Interests

Data Mining, Machine Learning, Cyber Security, Smart Power Grids, Wireless Sensor Networks, Bioinformatics, Chemoinformatics.

Education

- **Jan 2001 – Dec 2006:** Doctor of Philosophy in Computer Science, National University of Singapore. Ph.D. thesis title: "Computational Analysis of 3D Protein Structures".
- **Aug 1994 – Oct 1999:** Bachelor of Computer Science (First Class Honors), University of Computer Studies, Yangon, Myanmar (Burma).

Career History

- **May 2010 – Date:** Assistant Professor, Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates.
  - I was involved the following research projects as a **principal investigator**.
    1. Data mining for smart power grids (Masdar-MIT project; 2010-2013; Funding: USD 250,000)
    2. Monitoring and control of renewable energy generation (Masdar Institute project; 2011-2012; Funding: USD 99,977)
    3. Advanced load forecasting for smart buildings (Siemens AG project; 2012-2013; Funding: USD 298,957)
  - I am involved the following research project as a co-investigator.
    1. Sustainability as a service (Masdar Institute project; 2013-2014; Funding: USD 197,105)
- **May 2010 – Dec 2010:** Visiting Scholar, Massachusetts Institute of Technology, Cambridge, MA, United States.
  - I participated in the following research project as a team member.
    1. Simulation and analysis of smart power grids
- **Mar 2006 – Feb 2010:** Research Fellow, Data Mining Department, Institute for Infocomm Research, Singapore.
  - I carried out the following research projects as a **major contributor**.
    1. Indexing and retrieval of large chemical fingerprint databases
    2. Pattern mining in protein structures
    3. Discovery of ligand (drug) binding sites in protein structures

- I also participated in the following research projects as a team member.
  1. Indexing and mining of spatiotemporal data
  2. Mining of sequence-structure motif pairs in protein-protein binding
  3. Docking studies of the chemical compound Calothrixin
  4. Docking studies of the molecules Mcl-1 and Bcl-xL

- **Nov 1999 – Nov 2000:** Analyst-Programmer, Winner Computer Group Ltd., Myanmar (Burma).
  - I took part in the following software development projects as a team member.
    1. Integrated Information System for the Department of Health Planning, Ministry of Heath, Myanmar (Burma)
    2. Integrated Information System for the Department of Higher Education, Ministry of Education, Myanmar (Burma)

Awards and Scholarships

- **Oct 2012:** Second Prize, Competition on Fraud Detection in Mobile Advertising – held in conjunction with the 4th Asian Conference on Machine Learning (ACML'12).
- **May 2012:** Best Paper Award, the 2012 Pacific Asia Workshop on Intelligence and Security Informatics (PAISI'12).
- **Jul 2009:** Social Committee Services Award, Institute for Infocomm Research, Singapore.
- **Aug 2005:** Dean's Graduate Award, School of Computing, National University of Singapore.
- **Jan 2001 – Dec 2004:** Research Scholarship, National University of Singapore.
- **July 2000:** Excellent Award, Client-Server Database Development Course, Center of the International Cooperation for Computerization (CICC), Japan.
- **Oct 1999:** Ranked 1st out of 61 Bachelor of Computer Science (Honors) graduates, University of Computer Studies, Yangon, Myanmar (Burma).
- **Aug 1994 – Oct 1999:** University Scholarship, Ministry of Education, Myanmar (Burma).

Professional Services

- **Editorial Board Member**
  - International Journal of Advanced Computer Research (ACCENT Press)
  - International Journal of Computer Science and Engineering Technology (online journal: www.ijcset.org)
  - International Journal of Databases (online journal: www.ijdb.info)
  - International Journal of Knowledge Discovery in Bioinformatics (IGI Press)
  - International Journal of Machine Intelligence (Bioinfo Publications)
  - International Journal of Smart Grid and Clean Energy (Engineering and Technology Publishing)

- **Journal Reviewer**
  - Algorithms (MDPI - Open Access Press)
  - Bioinformatics (Oxford University Press)
  - Bioinformatics and Biology Insights (Libertas Academica Press)
  - BMC Bioinformatics (BioMed Central Press)
  - Genomics, Proteomics and Bioinformatics (Elsevier Press)
  - IEEE Intelligent Systems (IEEE Press)
  - IEEE Transactions on Power Systems (IEEE Press)
  - IEEE Transactions on Smart Grid (IEEE Press)
  - Indian Journal of Science and Technology (Indian Society of Education and Environment Press)
  - Information Sciences (Elsevier Press)
  - International Journal of Electrical Power and Energy Systems (Elsevier Press)
  - International Journal of Information Technology (World Academy of Science, Engineering and Technology Press)
  - Journal of Bioinformatics and Computational Biology (Imperial College Press)
  - Journal of Chemical Information and Modeling (American Chemical Society Press)
  - Journal of Communications (Academy Press)
  - Knowledge Engineering Review (Cambridge University Press)
  - Neural Computing and Applications (Springer Press)
  - Proteins: Structure, Function, and Bioinformatics (John Wiley & Sons Press)
  - Smart Grid and Renewable Energy (Scientific Research Publishing)
- **Keynote Speaker**
  - 2013
    - 2013 International Conference on Computer Science and Electronics Engineering (ICCSEE), 2013 (Title of Talk: "Cyber Security for Critical Infrastructures")
- **Conference/Workshop Organizer**
  - 2013
    - 1st ECML/PKDD Workshop on Data Analytics for Renewable Energy Integration (DARE), 2013 (Workshop Co-chair)
    - 2013 International Conference on Advanced Computing and Communication (ICACC), 2013 (Advisory Committee Member)
- **Conference/Workshop Technical Program Committee Member**
  - 2014
    - 26th International Conference on Scientific and Statistical Database Management (SSDBM), 2014

- 9th FTRA International Conference on Future Information Technology (FutureTech), 2014
- 7th International Conference on Bio-Science and Bio-Technology (BSBT), 2014
- 6th International Conference on Advances in Databases, Knowledge, and Data Applications (DBKDA), 2014
- 6th International Conference on Knowledge Discovery and Information Retrieval (KDIR), 2014
- 6th Asian Conference on Intelligent Information and Database Systems (ACIIDS), 2014
- 3rd International Workshop on Energy Data Management (EnDM), 2014
- 2014 International Conference on Smart Grid and Clean Energy Technologies (ICSGCE), 2014
- 2014 International Workshop on Smart Grid Networking and Communications (IWSGNC), 2014
- 2014 Knowledge Management International Conference (KMICe), 2014
- 2014 Annual International Conference on Intelligent Materials, Power and Energy (AIMPE), 2014

o 2013
- 6th International Conference on Bio-Science and Bio-Technology (BSBT), 2013
- 5th International Conference on Knowledge Discovery and Information Retrieval (KDIR), 2013
- 5th International Conference on Advances in Databases, Knowledge, and Data Applications (DBKDA), 2013
- 2013 IEEE International Conference on IT Convergence and Security (ICITCS), 2013
- 4th IEEE Workshop on Biological Data Mining and its Applications in Healthcare (BioDM), 2013
- 1st International Workshop on Cloud Data Mining (IWCDM), 2013
- 2013 Pacific Asia Workshop on Intelligence and Security Informatics (PAISI), 2013

o 2012
- 5th International Conference on Bio-Science and Bio-Technology (BSBT), 2012
- 3rd IEEE Workshop on Biological Data Mining and its Applications in Healthcare (BioDM), 2012
- 1st IEEE International Conference on Computer Systems and Industrial Informatics (ICCSII), 2012

o 2011
- 4th International Conference on Bio-Science and Bio-Technology (BSBT), 2011
- 2nd IEEE Workshop on Biological Data Mining and its Applications in Healthcare (BioDM), 2011

- 2010
  - 25th ACM Symposium on Applied Computing (SAC), Bioinformatics Track, 2010
  - 3rd International Conference on Bio-Science and Bio-Technology (BSBT), 2010
- 2007-2009
  - 24th ACM Symposium on Applied Computing (SAC), Bioinformatics Track, 2009
  - 23rd ACM Symposium on Applied Computing (SAC), Bioinformatics Track, 2008
  - 1st IEEE Workshop on Data Mining for Biomedical Applications (BioDM), 2007

Publications

- **Journal Papers**

1. M.A. Faisal, **Z. Aung**, J. Williams and A. Sanchez, "Data-stream-based intrusion detection system for advanced metering infrastructure in smart grid: A feasibility study," *IEEE Systems Journal*, accepted for publication.
2. D. Li, **Z. Aung**, J. Williams, and A. Sanchez, "Efficient and fault-diagnosable authentication architecture for AMI in smart grid," *Security and Communication Networks*, accepted for publication.
3. D. Li, **Z. Aung**, J. Williams, and A. Sanchez, "No peeking: Privacy-preserving demand response system in smart grids," *International Journal of Parallel, Emergent and Distributed Systems*, 29:290–315, 2014.
4. R. Oentaryo, E.P. Lim, F. Zhu, D. Lo, M. Finegold, C. Phua, E.Y. Cheu, G.E. Yap, K. Sim, M.N. Nguyen, K. Perera, B. Neupane, M.A. Faisal, **Z. Aung**, W.L. Woon, C. Wei, D. Patel, and D. Berrar, "Detecting fraudulent patterns in online advertising: A data mining approach," *Journal of Machine Learning Research*, 15:99–140, 2014.
5. D. Li, **Z. Aung**, S. Sampalli, J. Williams, and A. Sanchez, "Privacy preservation scheme for multicast communications in smart buildings of the smart grid," *Smart Grid and Renewable Energy*, 4: 313–324, 2013.
6. W. Hugo, F. Song, **Z. Aung**, S.K. Ng, and W.K. Sung, "SLiM on Diet: Finding short linear motifs on domain interaction interfaces in Protein Data Bank," *Bioinformatics*, 26: 1036–1042, 2010.
7. **Z. Aung**, S.H. Tan, S.K. Ng, and K.L. Tan, "PP*i*Clust: Efficient clustering of 3-D protein-protein interaction interfaces," *Journal of Bioinformatics and Computational Biology*, 6: 415–433, 2008.
8. **Z. Aung** and K.L. Tan, "Rapid retrieval of protein structures from databases," *Drug Discovery Today*, 12: 732–739, 2007.
9. **Z. Aung** and K.L. Tan, "MatAlign: Precise protein structure comparison by matrix alignment," *Journal of Bioinformatics and Computational Biology*, 4: 1197–1216, 2006.

10. **Z. Aung** and K.L. Tan, "Automatic 3D protein structure classification without structural alignment," *Journal of Computational Biology*, 12: 1221–1241, 2005.
11. **Z. Aung** and K.L. Tan, "Rapid 3D protein structure database searching using information retrieval techniques," *Bioinformatics*, 20: 1045–1052, 2004.

- **Book Chapters**

12. **Z. Aung**, "Database systems for the smart gird," in *Smart Grid: Opportunities, Developments and Trends* (edited by A. B. M. Shawkat Ali), Springer Press, pages 151–168, 2013.
13. **Z. Aung** and K.K. Nyunt, "Constructive knowledge management model and information retrieval methods for software engineering," in *Software Development Techniques for Constructive Information Systems Design* (edited by Khalid A. Buragga and Noor Zaman), IGI Global Press, pages 377–393, 2013.

- **Full-length Peer-reviewed Papers in Conferences/Workshops/Symposiums**

14. N. Liu, W.L. Woon, **Z. Aung**, and A. Afshari, "Handling class imbalance in customer behavior prediction," *2nd International Symposium on Big Data and Data Analytics in Collaboration (BDDAC'14)*, Minneapolis, Minnesota, USA, 2014, accepted for publication.
15. D. Li, **Z. Aung**, J. Williams, and A. Sanchez, "P2DR: Privacy-preserving demand response system in smart grids," *2014 IEEE International Conference on Computing, Networking and Communications (ICNC'14)*, Honolulu, Hawaii, USA, accepted for publication.
16. K.S. Perera, B. Neupane, M.A. Faisal, **Z. Aung**, and W.L. Woon, "A novel ensemble learning-based approach for click fraud detection in mobile advertising," *2013 International Conference on Mining Intelligence and Knowledge Exploration (MIKE'13)*, LNCS Vol. 8284, pages 370–382, 2013.
17. M.A. Azim and **Z. Aung**, "Simultaneous perturbation stochastic approximation-based localization algorithms for mobile devices," in *Proc. 6th IEEE International Conference on Developments in eSystems Engineering (DeSE'13)*, pages 1–6, 2013.
18. I. Khamis and **Z. Aung**, "Outlier preprocessing in wireless sensor networks: A two-layered ellipse approach," in *Proc. 6th IEEE International Conference on Developments in eSystems Engineering (DeSE'13)*, pages 1–6, 2013.
19. K.A. Ahmed, **Z. Aung**, and D. Svetinovic, "Smart grid wireless network security requirements analysis," in *Proc. 2013 IEEE International Conference on Cyber, Physical and Social Computing (CPSCom'13)*, pages 871–878, 2013.
20. W. Shen, V. Babushkin, **Z. Aung**, and W.L. Woon, "An ensemble model for day-ahead electricity demand time series forecasting," in *Proc. 4th ACM Conference on Future Energy Systems (e-Energy'13)*, pages 51–62, 2013.

21. M. Qasim, W.L. Woon, **Z. Aung**, and V. Khadkikar, "Intelligent edge detector based on multiple edge maps," in *Proc. 2012 IEEE International Conference on Computer Systems and Industrial Informatics (ICCSII'12)*, pages 1–6, 2012.
22. B. Neupane, K.S. Perera, **Z. Aung**, and W.L. Woon, "Artificial neural network-based electricity price forecasting for smart grid deployment," in *Proc. 2012 IEEE International Conference on Computer Systems and Industrial Informatics (ICCSII'12)*, pages 1–6, 2012.
23. M.A. Azim, **Z. Aung**, W. Xiao, V. Khadkikar, and A. Jamalipour, "Localization in wireless sensor networks by constrained simultaneous perturbation stochastic approximation technique," in *Proc. 6th IEEE International Conference on Signal Processing and Communication Systems (ICSPCS'12)*, pages 1–9, 2012.
24. D. Li, **Z. Aung**, J. Williams, and A. Sanchez, "P3: Privacy preservation protocol for appliance control application," in *Proc. 3rd IEEE International Conference on Smart Grid Communications (SmartGridComm'12)*, pages 294–299, 2012.
25. M.A. Azim, **Z. Aung**, W. Xiao, and V. Khadkikar, "Localization in wireless sensor networks by cross entropy method," in *Proc. 4th International Conference on Ad Hoc Networks (AdHocNets'12)*, LNICST Vol. 111, pages 103–118, 2012.
26. D. Li, **Z. Aung**, S. Sampalli, J. Williams, and A. Sanchez, "Privacy preservation for smart grid multicast via hybrid group key scheme," in *Proc. 2012 International Conference on Electrical Engineering and Computer Science (EECS'12)*, pages 62–69, 2012.
27. B. Neupane, **Z. Aung**, and W.L. Woon, "A new image edge detection method using quality-based clustering," in *Proc. 10th IASTED International Conference on Visualization, Imaging, and Image Processing (VIIP'12)*, pages 20–26, 2012.
28. M.A. Faisal, **Z. Aung**, J. Williams, and A. Sanchez, "Securing advanced metering infrastructure using intrusion detection system with data stream mining," in *Proc. 2012 Pacific Asia Workshop on Intelligence and Security Informatics (PAISI'12)*, LNCS Vol. 7299, pages 96–111, 2012. **(Won the best paper award.)**
29. **Z. Aung**, M. Toukhy, J. Williams, A. Sanchez, and S. Herrero, "Towards accurate electricity load forecasting in smart grids," in *Proc. 4th International Conference on Advances in Databases, Knowledge, and Data Applications (DBKDA'12)*, pages 51–57, 2012.
30. D. Li, **Z. Aung**, J. Williams, and A. Sanchez, "Efficient authentication scheme for data aggregation in smart grid with fault tolerance and fault diagnosis," in *Proc. 2012 IEEE Power and Energy Society Conference on Innovative Smart Grid Technologies (ISGT'12)*, pages 1–8, 2012.
31. J. Williams, S. Herrero-Lopez, C. Leonardi, S. Chan, A. Sanchez, and **Z. Aung**, "Large in-memory cyber-physical security-related analytics via scalable coherent shared memory

architectures," in *Proc. 2011 IEEE Symposium on Computational Intelligence in Cyber Security (CICS'11)*, pages 1–9, 2011.

32. **Z. Aung** and S.K. Ng, "An indexing scheme for fast and accurate chemical fingerprint database searching," in *Proc. 22nd International Conference on Scientific and Statistical Database Management (SSDBM'10)*, LNCS Vol. 6187, pages 288–305, 2010.
33. K. Sim, **Z. Aung**, and V. Gopalkrishnan, "Discovering correlated subspace clusters in 3D continuous-valued data," in *Proc. 10th IEEE International Conference on Data Mining (ICDM'10)*, pages 471–480, 2010.
34. **Z. Aung**, K. Sim, and W.S. Ng, "TrajAlign: A method for precise matching of 3-D trajectories," in *Proc. 20th International Conference on Pattern Recognition (ICPR'10)*, pages 3818–3821, 2010.
35. **Z. Aung** and J.C. Tong, "BSAlign: A rapid graph-based algorithm for detecting ligand-binding sites in protein structures," in *Proc. 19th International Conference on Genome Informatics (GIW'08)*, Genome Informatics Vol. 21, pages 65–76, 2008.
36. **Z. Aung**, S.H. Tan, S.K. Ng, and K.L. Tan, "Uncovering the structural basis of protein interactions with efficient clustering of 3-D interaction interfaces," in *Proc. 6th International Annual Conference on Computational Systems Bioinformatics (CSB'07)*, pages 287–297, 2007.
37. **Z. Aung** and J. Li, "Mining super-secondary structure motifs from 3D protein structures: A sequence order independent approach," in *Proc. 18th International Conference on Genome Informatics (GIW'07),* Genome Informatics Vol. 19, pages 15–26, 2007.
38. **Z. Aung** and K.L. Tan, "Automatic protein structure classification through structural fingerprinting," in *Proc. 4th IEEE Symposium on Bioinformatics and Bioengineering (BIBE'04)*, pages 508–515, 2004.
39. **Z. Aung,** W. Fu, and K.L. Tan, "An efficient index-based protein structure database searching method," in *Proc. 8th International Conference on Database Systems for Advanced Applications (DASFAA'03)*, pages 311–318, 2003.

- **Discussion, Short, and Poster Papers**

40. **Z. Aung**, "Discussion of the manuscript 'Short-term forecasting of the daily load curve for residential electricity usage in the smart grid' by S. Ghosh et al.," *Applied Stochastic Models in Business and Industry*, 29:624–625, 2013.
41. D. Svetinovic and **Z. Aung**, "Smart grid cyber security research at Masdar Institute of Science and Technology," in *Proc. 2013 Secure Abu Dhabi Conference (SAD'13)*, pages 15–16, 2013.

42. B. Neupane, K.S. Perera, **Z. Aung**, and W.L. Woon, "Towards accurate electricity price forecasting using artificial neural network," in *Proc. 2012 UAE-Swiss Research Day: Frontiers in Water, Energy, and Sustainability*, page 188, 2012.
43. C. Lim, S.L. Chua, X.F. Bong, C.G. Lim, S.Y.H. Lau, E.P. Wang, K.Y. Chung, V.P.Y. Wong, and **Z. Aung**, "Rapid chemical database search: A filter-and-refine approach," in *Poster Proc. 18th International Conference on Genome Informatics (GIW'07)*, pages 90–91, 2007.
44. **Z. Aung** and K.L. Tan, "Classifying protein folds using multi-level information of protein structures," in *Proc. SIG-Structure Meeting, 3rd Asia Pacific Bioinformatics Conference (APBC'05)*, pages 11–12, 2005.

- **Op-ed Articles**

45. **Z. Aung**, "The in-house brains behind Abu Dhabi's latest smart buildings," *The National*, December 30, 2012. (http://www.thenational.ae/news/uae-news/technology/the-in-house-brains-behind-abu-dhabis-latest-smart-buildings)
46. D. Li and **Z. Aung**, "Masdar Institute working to keep smart power grids safe from hackers," *The National*, January 15, 2012. (http://www.thenational.ae/news/uae-news/technology/masdar-institute-working-to-keep-smart-power-grids-safe-from-hackers)

Referees

Available upon request.