

CURRICULUM VITAE

Songjian Lu
University of Pittsburgh

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EDUCATION and TRAINING

12/2009	Texas A&M University College Station, TX	PhD Computer Science Jianer Chen and Sing-Hoi Sze GPA 4.0
12/2003	University of Houston at Clear Lake Clear Lake, TX	MS Computer Science
8/2001	University of Houston Houston, TX	MS Applied Mathematics

APPOINTMENTS and POSITIONS

Academic

8/1999 - 7/2001	University of Houston Houston, TX	Teaching Assistant Mathematics
8/2001 - 12/2003	University of Houston at Clear Lake Clear Lake, TX	Teaching Assistant Mathematics
8/2004 - 8/2008	Texas A&M University College Station, TX	Research Assistant Computer Science
8/2008 - 5/2009	Eastern Kentucky University Richmond, KY	Visiting Assistant Professor Computer Science
8/2009 - 7/2010	Medicine Medical University of South Carolina Charleston, SC	Postdoctoral Associate Biochemistry & Molecular Biology
8/2010 - 8/2015	Medicine University of Pittsburgh Pittsburgh, PA	Postdoctoral Associate Biomedical Informatics
9/2015 - Present	School of Medicine University of Pittsburgh Pittsburgh, PA	Assistant Professor Biomedical Informatics

HONORS and AWARDS

- 2012 DREAM 7 Challenge. Breast Cancer Challenge: Team “PittTransMed” placed second for Metabric phase of the Challenge.
- 2020 [IPEC-EATCS Nerode Prize](#), a theoretical computer science prize awarded, for developing the first fixed-parameter algorithm to solve a well-known open problem, [the directed feedback vertex set problem](#) : J. Chen, Y. Liu, **S. Lu**, B. O’Sullivan, I. Razgon. *A Fixed-Parameter Algorithm for the Directed Feedback Vertex Set Problem*. Journal of the ACM; 2008; 55 (5):21

PUBLICATIONS

Publications

1. S. Sze, **S. Lu**, J. Chen. *Integrating Sample-Driven and Pattern-Driven Approaches in Motif Finding*. In: Lecture Notes in Computer Science 3240. The 4th Workshop on Algorithms in Bioinformatics (WABI); 2004; 84-95.
2. Y. Liu, **S. Lu**, J. Chen, S. Sze. *Greedy Localization and Color-Coding: Improved Matching and Packing Algorithms*. In: Lecture Note in Computer Science 4169. International Workshop on Parameterized and Exact Computation (IWPEC); 2006 Sep 13-15; Zürich, Switzerland. 84-95.
3. **S. Lu**, F. Zhang, J. Chen, S. Sze. *Finding Pathway Structures in Protein Interaction Networks*. *Algorithmica*; 2007; 48 (4):363-374.
4. J. Chen, **S. Lu**, S. Sze, F. Zhang. *Improved Algorithms for Path, Matching, and Packing Problems*. In: Proc SODA 2007. 18th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA); 2007 Jan 7-9; New Orleans, Louisiana. 298-307.
5. J. Chen, **S. Lu**. *Improved Algorithms for Weighted and Unweighted Set Splitting Problem*. In: Lecture Note in Computer Science 4598. Computing and Combinatorics, 13th Annual International Conference (COCOON); 2007 Jul 16-19; Banff, Alberta, Canada. 537-547.
6. J. Chen, F. Fomin, Y. Liu, **S. Lu**, Y. Villanger. *Improved Algorithms for Feedback Vertex Set Problem*. In: Lecture Note in Computer Science 4619. Workshop on Software Architectures for Dependable Systems (WADS); 2007 Aug 15-17; Halifax, Nova Scotia, Canada. 422-433.
7. J. Chen, Y. Liu, **S. Lu**. *An Improved Parameterized Algorithm for the Minimum Node Multiway Cut Problem*. In: Lecture Note in Computer Science 4619. Workshop on Software Architectures for Dependable Systems (WADS); 2007 Aug 15-17; Halifax, Nova Scotia, Canada. 495-506.
8. J. Chen, Y. Liu, **S. Lu**. *Directed Feedback Vertex Set Problem is FPT*. *Structure Theory and FPT Algorithmics for Graphs, Digraphs and Hypergraphs*; 2007.
9. J. Chen, Y. Liu, **S. Lu**, B. O’Sullivan, I. Razgon. *A Fixed-Parameter Algorithm for the Directed Feedback Vertex Set Problem*. In: Proc. 40th annual ACM Symposium on Theory of Computing (STOC); 2008 May 17-20; Victoria, British Columbia, Canada. 177-186.
10. J. Chen, F. Fomin, Y. Liu, **S. Lu**, Y. Villanger. *Improved Algorithms for the Feedback Vertex Set Problems*. *Journal of Computer and System Science*; 2008; 74 (7):1188-1198.
11. J. Chen, Y. Liu, **S. Lu**, B. O’Sullivan, I. Razgon. *A Fixed-Parameter Algorithm for the Directed Feedback Vertex Set Problem*. *Journal of the ACM*; 2008; 55 (5):21.

12. Q. Feng, Y. Liu, **S. Lu**, J. Wang. *Improved Deterministic Algorithms for Weighted Matching and Packing Problems*. In: Lecture Note in Computer Science 5532. Theory and Applications of Models of Computation (TAMC); 2009 May 18-22; Changsha, China. 211-220.
13. J. Chen, Y. Liu, **S. Lu** . *An Improved Parameterized Algorithm for the Minimum Node Multiway Cut Problem*. *Algorithmica*; 2009; 55 (1):1-13.
14. J. Chen, **S. Lu**. *Improved Parameterized Set Splitting Algorithms: A Probabilistic Approach*. *Algorithmica*; 2009; 54 (4):472-489.
15. J. Chen, J. Kneis, **S. Lu**, D. Mölle, S. Richter, P. Rossmanith, S. Sze, F. Zhang. *Randomized divide-and-Conquer: Improved path, matching, and packing algorithm*. *SIAM Journal on Computing*; 2009; 38 (6):2526-2547.
16. **S. Lu**, X. Lu. *A graph model and an exact algorithm for finding transcription factor modules*. In: Proc. 2nd ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM-BCB); 2012 Jul 31-Aug 3; Chicago, IL. 355-359.
17. H. Feng, B. Hu, K. Liu, Y. Li, X. Lu, T. Cheng, J. Yiin, **S. Lu**, S. Keezer, T. Fenton, F. Furnari, R. Hamilton, K. Vuori, J. Sarkaria, M. Nagane, R. Nishikawa, W. Cavenee, S. Cheng. *Activation of Rac1 by Src-dependent phosphorylation of Dock180/Y1811 mediates PDGFR α -stimulated glioma tumorigenesis in mice and humans*. *The Journal of Clinical Investigation*. 2011; 121 (12):4670-4684; PMID:22080864 PMCID:PMC3223070
18. J. Chen, Q. Feng, Y. Liu, **S. Lu**, J. Wang. *Improved Deterministic Algorithms for Weighted Matching and Packing Problems*. *Theoretical Computer Science*; 2011; 412 (23):2503-2512.
19. **S. Lu**, X. Lu. *Integrating Genome and Functional Genomics Data to Reveal Perturbed Signaling Pathways in Ovarian Cancers*. In: Proc. 2012 AMIA Joint Summits on Translational Science (AMIA-TBI); 2012 Mar 19-23; San Francisco, CA; PMID:22779056 PMCID:PMC3392049
20. J. Chen, Y. Liu, **S. Lu**, S. Sze, F. Zhang. *Iterative Expansion and Color Coding: An Improved Algorithm for 3D-Matching*. *ACM Transactions on Algorithms*; 2012; 8 (1):6.
21. D. Montefusco, L. Chen, N. Matmati, **S. Lu**, B. Newcomb, G. Cooper, Y. Hannun, X. Lu. *Distinct signaling roles of ceramide species in yeast revealed through systematic perturbation and systems biology analyses*. *Signal Transduction and Targeted Therapy*; 2013; 6(229); PMID:24170935 PMCID:PMC3974757
22. **S. Lu**, B. Jin, L. Cowart, X. Lu. *From data towards knowledge: Revealing the architecture of signaling systems by unifying knowledge mining and data mining of systematic perturbation data*. *PLOS One*; 2013; 8(4); PMID:23637789 PMCID:PMC3634064
23. **S. Lu***, X. Lu. *Using graph model to find transcription factor modules: the hitting set problem and an exact algorithm*. *Algorithms for Molecular Biology*; 2013; 8(2); PMID:23324335 PMCID:PMC3622577
24. **S. Lu***, K. Lu, S. Cheng, B. Hu, X. Ma, N. Nystrom, X. Lu. *Identifying driver genomic alterations in cancers by searching minimum-weight, mutually exclusive sets*. *PLOS Computational Biology*; 2015 Aug; 11 (8):e1004257; PMID:26317392 PMCID:PMC4552843
25. **S. Lu***, G. Mandava, G. Yan, X. Lu. *An exact algorithm for finding cancer driver somatic genome alterations: the weighed mutually exclusive maximum set cover problem*. *Algorithms for Molecular Biology*; 2016 11(11); PMID:27148394 PMCID:PMC4855522
26. T. Huang, A. Alvarez, R. Pangeni, C. Horbinski, **S. Lu**, S. Kim, D. James, J. Raizer, J. Kessler, C. Brenann, E. Sulman, G. Finocchiaro, M. Tan, R. Nishikawa, X. Lu, I. Nakano, B. Hu, and S. Cheng. *A Regulatory Circuit of miR-125b/miR-20b and Wnt Signaling Controls GBM Phenotypes through FZD6-Mediated Pathways*. *Nature Communications*; 2016; 7:12885; PMID:27698350 PMCID:PMC5059456
27. **S. Lu**, C. Cai, G. Yan, Z. Zhou, Y. Wan, L. Chen, V. Chen, G. Cooper, L. Obeid, Y. Hannun, A. Lee and X. Lu. *Signal-oriented pathway analyses reveal a signaling complex as a synthetic lethal target for p53 mutations*. *Cancer Research*; 2016; 76(23):6785-6794; PMID:27758891 PMCID:PMC5165695

28. G. Yan, V. Chen, X. Lu, **S. Lu***. *A signal-based method for finding driver modules of breast cancer metastasis to the lung*. Scientific Reports; 2017; 7(1):10023; PMID:28855549 PMCID:PMC5577160
29. T. Huang, C. Kim, A. Alvarez, R. Pangeni, X. Wan, X. Song, T. Shi, Y. Yang¹, N. Sastry, C. Horbinski, **S. Lu**, R. Stupp, J. Kessler, R. Nishikawa, I. Nakano, E. Sulman, X. Lu, D. James, X. Yin, B. Hu¹, and S. Cheng. *MST4 Phosphorylation of ATG4B Regulates Autophagic Activity, Tumorigenicity and Radioresistance in Glioblastoma*. Cancer Cell; 2017; 32(6); PMID:29232556 PMCID:PMC5734934
30. H. Sadahiro, K. Kang, J. Gibson, M. Minata, H. Yu, J. Shi, R. Chhipa, Z. Chen, **S. Lu**, Y. Simoni, T. Furuta, H. Sabit, S. Zhang, S. Bastola, S. Yamaguchi, H. Alsheikh, S. Komarova, J. Wang, S. Kim, D. Hambardzumyan, X. Lu, E. Newell, B. Dasgupta, M. Nakada, L. Lee, B. Nabors, L. Norian, and I. Nakano. *Activation of the receptor tyrosine kinase AXL mediates the immune microenvironment in glioblastoma*. Cancer Research; 2018; 78(11); PMID:29531161 PMCID:PMC5984695
31. R. Pangeni, Z. Zhang, A. Alvarez, X. Wan, N. Sastry, **S. Lu**, T. Shi, T. Huang, C. Lei, C. James, J. Kessler, C. Brennan, I. Nakano, X. Lu, B. Hu, W. Zhang, S. Cheng. *Genome-wide methylomic and transcriptomic analyses identify subtype-specific epigenetic signatures commonly dysregulated in glioma stem cells and glioblastoma*. Epigenetics; 2018; 13(4); DOI: 10.1080/15592294.2018.1469892; PMID:29927689 PMCID:PMC6140806
32. **S. Lu***, X. Fan, L. Chen, X. Lu. *A novel method of using Deep Belief Networks and genetic perturbation data to search for yeast signaling pathways*. PLoS One; 2018; 13(9):e0203871; PMID:30208101 PMCID:PMC6135403
33. X. Wang, M. O'Brien, J. Yu, L. Liang, Q. Zhang, **S. Lu**, X. An, J. McDyer, R. Mallampalli. *Prolonged cold-ischemia induces necroptotic cell death after experimental lung transplantation*. American Journal of Respiratory Cell and Molecular Biology; 2019; PMID: 30742487. PMCID: PMC6670033 [Available on 2020-08-01]
34. Fan, S. Zhang*, S. Zhang, K. Zhu, **S. Lu***. *Prediction of lncRNA-disease associations by integrating diverse heterogeneous information sources with RWR algorithm and positive pointwise mutual information*, BMC Bioinformatics; 2019 Feb 19;20(1):87, doi: 10.1186/s12859-019-2675-y. PMID: 30782113 PMCID: PMC6381749
35. M. Minata, A. Audia, J. Shi, **S. Lu**, J. Bernstock, M. Pavlyukov, A. Das, S. Kim, Y. Shin, Y. Lee, H. Koo, K. Snigdha, I. Waghmare, X. Guo, A. Mohyeldin, D. Gallego-Perez, J. Wang, D. Chen, P. Cheng, F. Mukheef, M. Contreras, J. Reyes, B. Vaillant, E. Sulman, S. Cheng, J. Markert, B. Tannous, X. Lu, M. Kango-Singh, L. J. Lee, D. Nam, I. Nakano, K. Bhat. *Phenotypic Plasticity of Invasive Edge Glioma Stem-like Cells in Response to Ionizing Radiation*, Cell Reports; 2019; 26(7); 1893-1905.e7, doi: 10.1016/j.celrep.2019.01.076, PMID:30759398, PMCID: PMC659437
36. L. Liang, V. Chen, K. Zhu, X. Fan, X. Lu, **S. Lu***. *Integrating data and knowledge to identify functional modules of genes: a multilayer approach*. BMC Bioinformatics; 2019 May 2; 20(225); doi: 10.1186/s12859-019-2800-y. PMID: 31046665, PMID: PMC6498600
37. C. Cai, G. Cooper, K. Lu, X. Ma, S. Xu, Z. Zhao, X. Chen, Y. Xue, A. Lee, N. Clark, V. Chen, **S. Lu**, L. Chen, L. Yu, H. Hochheiser, X. Jiang, J. Wang, X. Lu. *Systematic discovery of the functional impact of somatic genome alterations in individual tumors through tumor-specific causal inference*. PLoS Computational Biology. 2019 Jul 5;15(7):e1007088. doi: 10.1371/journal.pcbi.1007088; PMID: 31276486; PMCID: PMC665088
38. Y. Xue, G. Cooper, C. Cai, **S. Lu**, B. Hu, X. Ma, and X. Lu. *Tumour-specific Causal Inference Discovers Distinct Disease Mechanisms Underlying Cancer Subtypes*. Scientific Reports; 2019 Sep 13;9(1):13225. doi: 10.1038/s41598-019-48318-7; PMID: 31519988 PMCID: PMC67744493
39. L. Liang, K. Zhu, **S. Lu***. *BEM: Mining Coregulation Patterns in Transcriptomics via Boolean Matrix Factorization*. Bioinformatics. 2020 Jan 8. pii: btz977. doi: 10.1093/bioinformatics/btz977.

RESEARCH

Current research support

Funding Agency: NIH/NCI
Grant Number: 5P30 CA047904, Ferris
Title of Grant: Cancer Center Support Grant (CCSG)
Principal Investigator: Uma Chandran
Lu Role on Grant: Co-I (20% effort)
Years Inclusive: 9/1/2019 - 7/31/2020
Total Amount Awarded: \$348,154

Funding Agency: NIH/NCI, CCSG/HCC Pilot
Grant Number: 5P30 CA047904
Title of Grant: A collaboration between wet- and dry-labs to understand the cancer mechanism using a highly manipulable system
Principal Investigator: Songjian Lu, Shou-Jiang Gao, Xinghua Lu
Lu Role on Grant: Co-PI (30% effort)
Years Inclusive: 7/1/2019 - 6/30/2020
Total Amount Awarded: \$50,000

Past research support

Funding Agency: NIH
Grant Number: 4R00LM011673
Title of Grant: Developing graph models and efficient algorithms for the study of cancer disease
Principal Investigator: Songjian Lu
Lu Role on Grant: PI (sole)
Years Inclusive: 9/1/2015 - 8/31/2018
Total Amount Awarded: \$740,000

Funding Agency: NIH
Grant Number: 5K99 LM011673
Title of Grant: Developing graph models and efficient algorithms for the study of cancer disease mechanisms
Principal Investigator: Songjian Lu
Lu Role on Grant: PI (sole)
Years Inclusive: 2/2014 - 8/2015
Total Amount Awarded: \$140,000

OTHER SCHOLARLY ACTIVITIES

Review Activities

2007 Referee, Algorithmica and SIAM Journal on Computing.
2008 Referee, Information Processing Letters.
2013 Referee, BioMed Research International and the 38th International Symposium on

	Mathematical Foundations of Computer Science (MFCS2013)
2015	Referee, FAW-2015: 9th International Frontiers of Algorithmics Workshop.
2016	Referee, PLOS Computational Biology.
2017	Referee, the IEEE/ACM Transactions on Computational Biology and Bioinformatics; the 8th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB2017); the IEEE/ACM Transactions on Computational Biology and Bioinformatics; of the 11th International Conference on Computational Systems Biology (ISB 2017); Scientific Reports.
2018	Referee, the IEEE/ACM Transactions on Computational Biology and Bioinformatics; the PLoS ONE; the PLoS Computational Biology (two); the BMC Bioinformatics .
2019	Referee, Bioinformatics, Transactions on Computational Biology and Bioinformatics, PLoS Computational Biology.
2020	Referee, Transactions on Computational Biology and Bioinformatics, IEEE Access.

Other Activities

2014	Panel Member, NIH K99/R00 Award Workshop at the University of Pittsburgh
2016	Career Transition Panel, the NLM Informatics Conference at Columbus, OH
2014	Panel Member, NIH K99/R00 Award Workshop at the University of Pittsburgh
2018	Review research proposal for internal seed funding at Arkansas State University.
2019	Review research proposal for UPMC Hillman Cancer Center Developmental Funding Program.

TEACHING

Graduate Courses

Year(s)	Course Number & Title	Role
9/7/2015 - 9/7/2015	BIOINF 2051, Foundations of Bioinformatics	Guest Lecturer
9/9/2015 - 9/9/2015	BIOINF 2051, Foundations of Bioinformatics	Guest Lecturer
11/9/2015 - 11/9/2015	BIOINF 2051, Foundations of Bioinformatics	Guest Lecturer
03/22/2017 - 03/22/2017	BIOINF 2016, Foundations of Translational Bioinformatics	Guest Lecturer
03/13/2017 - 04/26/2017	BIOINF 2119, Probabilistic Methods in Artificial Intelligence	Lecturer
03/12/2018 - 04/09/2017	BIOINF 2119, Probabilistic Methods in Artificial Intelligence	Lecturer
01/27/2020 - 02/10/2020	BIOINF 2071 Foundations of Biomedical Informatics	Lecturer, Course Director

Postdoctoral Courses

Year(s)	Course Number & Title	Role
5/19/2015 - 5/19/2015	BIOINF 2132, Grant Writing in Biomedical Informatics	Guest Lecturer
10/28/2014 - 10/28/2014	Workshop on NIH K99/R00 awards for postdocs	Member of K99/R00 Panel

MENTORING AND ADVISING

Undergraduate Students

Year(s)	Student's Name & Department/Degree/Discipline	Role	Co-publication#
9/2015 – 8/2017	Gaibo Yan University of Pittsburgh Study of the cancer metastasis mechanism	Mentor	1
1/2019 - Present	David Gao University of Pittsburgh Study breast oncogenic pathways	Mentor	

Doctoral Students

Year(s)	Student's Name & Department/Degree/Discipline	Role	Co-publication#
9/2015 – 9/2016	Rick Jordan, MS Biomedical Informatics Ph.D. Literature Mining Sustains and Enhances Knowledges Discovery from Omic Studies	Doctoral dissertation committee member	
8/2018 - Present	Jonathan Young, MD Biomedical Informatics Ph.D. student	Doctoral dissertation committee member	
8/2018 - Present	Xuer Chen, MS Biomedical Informatics Ph.D. student	Doctoral dissertation committee member	
1/2018 - Present	Yifan Xue, MS Biomedical Informatics Ph.D. student	MS thesis and Doctoral dissertation committee member	1
9/2015 - Present	Lifan Liang, MS Biomedical Informatics Ph.D. student	Advisor	3

Visiting Scholars

Year(s)	Student's Name & Department/Degree/Discipline	Role	Co-publication#
10/2016 – 10/2018	Xiaona Fan, PhD. candidate	Mentor	3

Ph.D. student
Key Laboratory of Information Fusion
Technology, Department of Automation
Northwestern Polytechnical University,
China

1/2018 - Present	Kunju Zhu, MD., Ph.D. Associate Professor/Researcher Clinical Medicine Research Institute Jinan University, China	Mentor	3
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