# Chao Xu

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## Research Interests

Combinatorial Optimization · Computational Geometry · Algorithms

## Education

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| 2013-2018 | PHD in Computer Science, University of Illinois at Urbana-Champaign<br>Advisors: Karthik Chandrasekaran and Chandra Chekuri. |
| 2009-2013 | BS in Mathematics and Applied Mathematics & Statistics with minor in Computer Science, Stony Brook University |

## Employment

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| Jan.2022-now | **Assistant Professor, UESTC**, Chengdu, China.<br>School of Computer Science and Engineering. |
| Mar.2020-Mar.2021 | **Software Engineer, Voleon**, Berkeley, CA, USA.<br>Research Engineering. |
| Sep.2019-Mar.2020 | **Senior Software Engineer, Grab**, Bellevue, WA, USA.<br>Grab Artificial Intelligence Accelerator. |
| Jun.2018-Aug.2019 | **Research Scientist, Yahoo! Research**, New York, NY, USA.<br>Scalable Machine Learning Group. |
| Feb.-Aug. 2013 | **Software Engineer, Google**, Mountain View, CA, USA.<br>Google Analytics Backend. |

## Visiting Positions

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| Jan.-June. 2023 | **Visiting Researcher, Tepper School of Business, Carnegie Mellon University**, Pittsburgh, USA.<br>Hosted by Benjamin Moseley. |
| Jun.-Aug. 2017 | **Visiting Researcher, National Institute of Informatics**, Tokyo, Japan.<br>Hosted by Ken-ichi Kawarabayashi. |
| Jun.-Aug. 2015 | **Visiting Scholar, New York University**, New York, USA.<br>Hosted by Boris Aronov. |

# Conference Publications[1]

2023    J. Wang, C. Xu, and S. Zhou. Solving systems of linear equations through zero forcing set. In W. Wu and G. Tong, editors, *Computing and Combinatorics*, pages 353–365, Cham, 2024. Springer Nature Switzerland.

2023    T. Hirayama, Y. Liu, K. Makino, K. Shi, and C. Xu. A Polynomial Time Algorithm for Finding a Minimum 4-Partition of a Submodular Function. In ***SODA 2023***.

2022*   P. Yu, C. Xu, A. Bifet, and J. Read. Linear TreeShap. In ***NeurIPS 2022, Oral***.

2022    C. Beideman, K. Chandrasekaran, C. Chekuri, and C. Xu. Approximate Representation of Symmetric Submodular Functions via Hypergraph Cut Functions. In ***FSTTCS 2022***.

2022*   J. Zhao, M. Xiao, and C. Xu. Improved Approximation Algorithms for the Traveling Tournament Problem. In S. Szeider, R. Ganian, and A. Silva, editors, *47th International Symposium on Mathematical Foundations of Computer Science (**MFCS 2022**)*, volume 241 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 83:1–83:15, Dagstuhl, Germany, 2022. Schloss Dagstuhl – Leibniz-Zentrum für Informatik.

2020    C. Beideman, K. Chandrasekaran, and C. Xu. Multicriteria Cuts and Size-Constrained k-Cuts in Hypergraphs. In J. Byrka and R. Meka, editors, *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/**RANDOM** 2020)*, volume 176 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 17:1–17:21, Dagstuhl, Germany, 2020. Schloss Dagstuhl–Leibniz-Zentrum für Informatik.

2019    C. Chekuri, K. Quanrud, and C. Xu. LP Relaxation and Tree Packing for Minimum k-cuts. In J. T. Fineman and M. Mitzenmacher, editors, *2nd Symposium on Simplicity in Algorithms (**SOSA** 2019)*, volume 69 of *OpenAccess Series in Informatics (OASIcs)*, pages 7:1–7:18, Dagstuhl, Germany, 2018. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

2018    K. Chandrasekara, C. Xu, and X. Yu. Hypergraph $k$-cut in randomized polynomial time. In *Proceedings of the Twenty-Ninth Annual ACM-SIAM Symposium on Discrete Algorithms (**SODA**)*, pages 1426–1438, 2018.

2017    K. Bérczi, K. Chandrasekaran, T. Király, E. Lee, and C. Xu. Global and Fixed-Terminal Cuts in Digraphs. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (**APPROX**/RANDOM 2017)*, volume 81 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 2:1–2:20, Dagstuhl, Germany, 2017.

2017    K. Koiliaris and C. Xu. A faster pseudopolynomial time algorithm for subset sum. In *Proceedings of the Twenty-Eighth Annual ACM-SIAM Symposium on Discrete Algorithms (**SODA**)*, pages 1062–1072. SIAM, 2017.

2017    C. Chekuri and C. Xu. Computing minimum cuts in hypergraphs. In *Proceedings of the Twenty-Eighth Annual ACM-SIAM Symposium on Discrete Algorithms (**SODA**)*, pages 1085–1100. SIAM, 2017.

2015    C. Chekuri, T. Rukkanchanunt, and C. Xu. On element-connectivity preserving graph simplification. In N. Bansal and I. Finocchi, editors, *Algorithms - **ESA** 2015*, volume 9294 of *Lecture Notes in Computer Science*, pages 313–324. Springer Berlin Heidelberg, 2015.

2015    H.-C. Chang, J. Erickson, and C. Xu. Detecting weakly simple polygons. In *Proceedings of the Twenty-Sixth Annual ACM-SIAM Symposium on Discrete Algorithms (**SODA**)*, pages 1655–1670. SIAM, 2015.

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[1]By convention in theoretical computer science and mathematics, author orders of all papers are alphabetical.

∗ the author order is determined by contribution.

## Journal Publications

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| 2023 | T. Hirayama, Y. Liu, K. Makino, K. Shi, and C. Xu. A polynomial time algorithm for finding a minimum 4-partition of a submodular function. **Mathematical Programming**, 2023. |
| 2021 | C. Beideman, K. Chandrasekaran, and C. Xu. Multicriteria cuts and size-constrained k-cuts in hypergraphs. **Mathematical Programming**, 2021. |
| 2020 | K.-i. Kawarabayashi and C. Xu. Minimum violation vertex maps and their applications to cut problems. **SIAM Journal on Discrete Mathematics**, 34(4):2183–2207, 2020. |
| 2020 | A. Gharehgozli, C. Xu, and W. Zhang. High multiplicity asymmetric traveling salesman problem with feedback vertex set and its application to storage/retrieval system. **European Journal of Operational Research**, 289(2):495–507, 2021. |
| 2020 | C. Chekuri, K. Quanrud, and C. Xu. LP Relaxation and Tree Packing for Minimum $k$-Cut. **SIAM Journal on Discrete Mathematics**, 34(2):1334–1353, 2020. |
| 2019 | K. Chandrasekaran, C. Xu, and X. Yu. Hypergraph $k$-cut in randomized polynomial time. **Mathematical Programming**, 186:85–113, March 2021. |
| 2019 | K. Koiliaris and C. Xu. Faster pseudopolynomial time algorithms for subset sum. **ACM Trans. Algorithms**, 15(3):40:1–40:20, June 2019. |
| 2018 | C. Chekuri and C. Xu. Minimum cuts and sparsification in hypergraphs. **SIAM Journal on Computing**, 47(6):2118–2156, 2018. |
| 2018 | C. Xu and Q. Zhang. The shortest kinship description problem. **Information Processing Letters**, 138:61 – 66, 2018. |
| 2018 | K. Bérczi, K. Chandrasekaran, T. Király, E. Lee, and C. Xu. Beating the 2-approximation factor for global bicut. **Mathematical Programming**, 177(1):291–320, Sep 2019. |
| 2016 | C. Xu. Reconstructing edge-disjoint paths faster. **Operations Research Letters**, 44(2):174 – 176, 2016. |
| 2013 | N. J. Calkin, J. E. Janoski, A. Nelson, S. Ryan, and C. Xu. Champion spiders in the game of Graph Nim. **Congr. Numer.**, 218:5–19, 2013. |

## Teaching

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| S 2022 | CS @ UESTC. |
| F 2016 | CS 374 Algorithms and Models of Computation @ UIUC. Teaching Assistant |
| F 2015 | CS 498 DL1 "new " CS 473 Theory II @ UIUC. Teaching Assistant |
| S 2015 | CS 498 DL1 "new " CS 473 Theory II @ UIUC. Teaching Assistant |
| F 2014 | CS 374 Algorithms and Models of Computation @ UIUC. Teaching Assistant |
| F 2013 | CS 373 Introduction to Theory of Computation @ UIUC. Teaching Assistant |
| F 2010 | AMS 345 Computational Geometry @ Stony Brook University. Teaching Assistant |