

*CURRICULUM VITAE*  
**Hu Ding**

**Contact:**

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**Personal data**

- Birthday: December 13, 1986.
- Citizenship: P. R. China.

**Research Interests**

Geometric algorithms emphasizing both theoretical development and their applications in practical areas, such as data analysis, machine learning, biomedical image analysis, and internet of things.

**Education**

- **PhD in Computer Science and Engineering**, State University of New York at Buffalo, Buffalo, NY, USA, 2015.  
Advisor: Prof. Jinhui Xu.
- **BS in Mathematics**, Sun Yat-Sen University ( Zhong Shan University), Guang Zhou, China, 2009.

**Employment**

- 06/2018-present, **Professor (pre-tenure)**, School of Computer Science and Technology, University of Science and Technology of China, He Fei, China.
- 01/2016-06/2019 (on leave 06/2018-06/2019), **Tenure-Track Assistant Professor**, Department of Computer Science and Engineering, Michigan State University, East Lansing, MI, USA.
- 09/2015-05/2016, **Joint Simons-Berkeley Research Fellowship** at Tsinghua University and University of California at Berkeley.

**Grants**

- NSF: CRII: AF (#1656905): Novel geometric algorithms for certain data analysis problems, \$174,328, H. Ding (PI), 05/15/2017- 05/14/2019.

**Publications**

**Peer-Reviewed Conference Papers:**

1. **H. Ding**, “A Sub-linear Time Framework for Geometric Optimization with Outliers in High Dimensions”, to appear in *the 28th European Symposium on Algorithms (ESA’20)*, 2020.
2. **H. Ding**, Z. Wang, “Layered Sampling for Robust Optimization Problems”, to appear in *the International Conference on Machine Learning (ICML’20)*, 2020.
3. **H. Ding**, Fan Yang, and M. Wang, “On Metric DBSCAN with Low Doubling Dimension”, to appear in *the International Joint Conference on Artificial Intelligence (IJCAI’20)*, 2020.
4. **H. Ding**, H. Yu, and Z. Wang, “Greedy Strategy Works for k-Center Clustering with Outliers and Coreset Construction,” *The 27th Annual European Symposium on Algorithms (ESA’19)*, pp. 40:1-40:16, Munich/Garching, Germany, September 9-11, 2019.
5. **H. Ding** and M. Ye, “On Geometric Alignment in Low Doubling Dimension,” *The 33rd AAAI Conference on Artificial Intelligence (AAAI’19)*, pp. 1460-1467, Honolulu, Hawaii, USA, Jan 27-Feb 1, 2019.

6. **H. Ding** and M. Liu, “On Geometric Prototype and Applications,” *The 26th Annual European Symposium on Algorithms (ESA’18)*, pp. 23:1-23:15, Helsinki, Finland, Aug 20-22, 2018.
7. M. Liu and **H. Ding**, “Protein Mover’s Distance: A Geometric Framework for Solving Global Alignment of PPI Networks,” *The 11th International Conference on Combinatorial Optimization and Applications (COCOA’17)*, pp. 56-69, Shanghai, China, Dec 16-18, 2017.
8. **H. Ding**, “Balanced  $k$ -Center Clustering When  $k$  Is A Constant,” *The 29th Canadian Conference on Computational Geometry (CCCG’17)*, Ottawa, Canada, July 26-28, 2017.
9. **H. Ding**, L. Hu, L. Huang, and J. Li, “Capacitated Center Problems with Two-Sided Bounds and Outliers,” *The 15th International Algorithms and Data Structures Symposium (WADS’17)*, pp. 325-336, St. John’s, Canada, July 31-August 2, 2017.
10. Z. Huang, **H. Ding**, and J. Xu, “Faster Algorithm for Truth Discovery via Range Cover,” *The 15th International Algorithms and Data Structures Symposium (WADS’17)*, pp. 461-472, St. John’s, Canada, July 31-August 2, 2017.
11. Y. Liu, **H. Ding**, D. Chen, and J. Xu, “Novel Geometric Approach for Global Alignment of PPI Networks,” *The 31st AAAI Conference on Artificial Intelligence (AAAI’17)*, pp. 31-37, San Francisco, CA, USA, February 4-9, 2017.
12. Y. Liu, **H. Ding**, Z. Huang, and J. Xu, “Distributed and Robust Support Vector Machine,” *The 27th International Symposium on Algorithms and Computation (ISAAC’16)*, 54:1-54:13, Sydney, Australia, December 12-14, 2016.
13. Z. Chen, D. Chen, **H. Ding**, Z. Huang, Z. Li, N. Sehgal, A. Fritz, R. Berezney, and J. Xu, “Finding Rigid Sub-Structure Patterns From 3D Point-Sets,” *The 23rd International Conference on Pattern Recognition (ICPR’16)*, Cancun, Mexico, December 4-8, 2016.
14. **H. Ding**, Y. Liu, L. Huang, and J. Li, “K-Means Clustering with Distributed Dimensions,” *The 33rd International Conference on Machine Learning (ICML’16)*, pp. 1339-1348, New York City, NY, USA, June 19-24, 2016.
15. **H. Ding**, L. Su, and J. Xu, “Towards Distributed Ensemble Clustering for Networked Sensing Systems: A Novel Geometric Approach,” *The 17th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc’16)*, pp. 1-10, Paderborn, Germany, July 4-8, 2016.
16. **H. Ding**, J. Gao, and J. Xu, “Finding Global Optimum for Truth Discovery: Entropy Based Geometric Variance,” *The 32nd International Symposium on Computational Geometry (SoCG’16)*, 34:1-34:16, Boston, MA, USA, June 14-18, 2016.
17. C. Meng, W. Jiang, Y. Li, J. Gao, L. Su, **H. Ding**, and Y. Cheng, “Truth Discovery on Crowd Sensing of Correlated Entities”, *The 13th ACM Conference on Embedded Networked Sensor Systems (SenSys’15)*, pp. 169-182, Seoul, South Korea, November 1-4, 2015.
18. Z. Chen, **H. Ding**, D. Chen, X. Wang, A. Fritz, N. Sehgal, R. Berezney, and J. Xu, “Mining k-Median Chromosome Association Graphs from a Population of Heterogeneous Cells”, *The 6th ACM Conference on Bioinformatics, Computational Biology and Health Informatics (ACM-BCB’15)*, pp. 47-56, Atlanta, GA, USA, September 9-12, 2015.
19. **H. Ding** and J. Xu, “Random Gradient Descent Tree: A Combinatorial Approach for SVM with Outliers,” *Proc. 29th AAAI Conference on Artificial Intelligence (AAAI’15)*, pp. 2561-2567, Austin, Texas, USA, January 25-30, 2015.
20. **H. Ding** and J. Xu, “A Unified Framework for Clustering Constrained Data without Locality Property”, *Proc. 26th ACM-SIAM Symposium on Discrete Algorithms (SODA’15)*, pp. 1471-1490, San Diego, CA, USA, January 4-6, 2015.
21. **H. Ding** and J. Xu, “Finding Median Point-Set Using Earth Mover’s Distance,” *Proc. 28th AAAI Conference on Artificial Intelligence (AAAI’14)*, pp. 1781-1787, Québec City, Québec, Canada, July 27 -31, 2014.
22. **H. Ding** and J. Xu, “Sub-linear Time Hybrid Approximations for Least Trimmed Squares Estimator and Related Problems,” *Proc. 30th ACM Symposium on Computational Geometry (SoCG’14)*, pp. 110-119, Kyoto, Japan, June 08 - 11, 2014.

23. **H. Ding**, R. Berezney, and J. Xu, “k-Prototype Learning for 3D Rigid Structures,” *Advances in Neural Information Processing Systems (NIPS’13)*, pp. 2589-2597, Lake Tahoe, Nevada, USA, December 5-8, 2013.
24. **H. Ding** and J. Xu, “FPTAS for Minimizing Earth Mover’s Distance under Rigid Transformations,” *Proc. 21st European Symposium on Algorithms (ESA’13)*, pp. 397-408, Sophia Antipolis, France, September 2-4, 2013.
25. **H. Ding**, B. Stojkovic, R. Berezney, and J. Xu, “Gauging Association Patterns of Chromosome Territories via Chromatic Median,” *Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR’13)*, pp.1296-1303, Portland, OR, USA, June 23-28, 2013. **Oral presentation** (acceptance rate: 3.2%).
26. L. Xu, B. Stojkovic, **H. Ding**, Q. Song, X. Wu, M. Sonka, and J. Xu, “Efficient Searching of Globally Optimal and Smooth Multisurfaces with Shape Priors,” *Proc. SPIE Symposium on Medical Imaging*, 83140N, San Diego, California, USA, February 4, 2012.
27. L. Xu, B. Stojkovic, **H. Ding**, Q. Song, X. Wu, M. Sonka, and J. Xu, “Faster Segmentation Algorithm for Optical Coherence Tomography Images with Guaranteed Smoothness,” *Proc. 2nd International Workshop: Machine Learning in Medical Imaging (Conjunction with MICCAI 2011)*, pp. 308-316, Toronto, Canada, September 18, 2011.
28. **H. Ding** and J. Xu, “Solving the Chromatic Cone Clustering Problem via Minimum Spanning Sphere,” *Proc. 38th International Colloquium on Automata, Languages and Programming (ICALP’11)*, pp. 773-784, Zürich, Switzerland, July 4-8, 2011.

#### Peer-Reviewed Journal Papers:

29. **H. Ding** and J. Xu, “Learning the Truth Vector in High Dimensions,” *Journal of Computer and System Sciences*, 109: 78-94 (2020).
30. **H. Ding** and J. Xu, “A Unified Framework for Clustering Constrained Data without Locality Property,” *Algorithmica*, 82(4): 808-852 (2020).
31. Z. Huang, **H. Ding**, and J. Xu, “Faster Algorithm for Truth Discovery via Range Cover,” *Algorithmica*, Volume 81, Issue 10, October, 2019, pp. 4118-4133.
32. **H. Ding** and J. Xu, “FPTAS for Minimizing the Earth Mover’s Distance Under Rigid Transformations and Related Problems,” *Algorithmica*, Volume 78, Issue 3, July 2017, pp. 741-770.
33. N. Sehgal, B. Seifert, **H. Ding**, Z. Chen, B. Stojkovic, S. Bhattacharya, J. Xu, and R. Berezney, “Reorganization of the interchromosomal network during keratinocyte differentiation,” *Chromosoma*, Volume 125, Number 3, June 2016, pp. 389-403. Impact factor: 4.303 (2017).
34. **H. Ding**, B. Stojkovic, A. Huges, Z. Chen, L. Xu, A. J. Fritz, R. Berezney, and J. Xu, “Chromatic Kernel and Its Applications,” *Journal of Combinatorial Optimization*, Volume 31, Number 3, April 2016, pp. 1298-1315.
35. N. Sehgal, A. Fritz, J. Vecerova, **H. Ding**, Z. Chen, B. Stojkovic, S. Bhattacharya, J. Xu, and R. Berezney, “Large Scale Probabilistic 3-D Organization of Human Chromosome Territories,” *Human Molecular Genetics*, Volume 25, Number 3, February 2016, pp. 419-436. Impact factor: 5.985 (2015). (**Awarded Cover Page, and recommended by F1000Prime as an Article of Special Significance to its Field**)
36. A. Pliss, A. J. Fritz, B. Stojkovic, **H. Ding**, L. Mukherjee, S. Bhattacharya, J. Xu, and R. Berezney, “Non-random Patterns in the Distribution of NOR-bearing Chromosome Territories in Human Fibroblasts: A Network Model of Interactions,” *Journal of Cellular Physiology*, Volume 230, Issue 2, February 2015, pp. 427-439. Impact factor: 3.839 (2014). (**Awarded Cover Page**)
37. A. J. Fritz, B. Stojkovic, **H. Ding**, J. Xu, S. Bhattacharya, and R. Berezney, “Cell Type Specific Alterations in Interchromosomal Networks Across the Cell Cycle,” *PLoS Computational Biology*, Volume 10, Issue 10, October 2014, e1003857. Impact factor: 4.587 (2015).
38. A.J. Fritz, B. Stojkovic, **H. Ding**, J. Xu, S. Bhattacharya, D. Galle, and R. Berezney, “Wide-scale Alterations in Interchromosomal Organization in Breast Cancer Cells: Defining a Network

of Interacting Chromosomes,” *Human Molecular Genetics* Volume 23, Number 19, October 2014, pp. 5133-5146. Impact factor:5.985 (2015).

#### Workshop Papers:

39. **Hu Ding**, Yu Liu, Lingxiao Huang, and Jian Li, “K-Means Clustering with Distributed Dimensions (abstract version),” *Fall Workshop on Computational Geometry (FWCG’16)*, NYC, NY, USA, October 27-28, 2016.
40. Yangwei Liu, **Hu Ding**, Ziyun Huang, and Jinhui Xu, “Distributed and Robust Support Vector Machine (abstract version),” *Fall Workshop on Computational Geometry (FWCG’16)*, NYC, NY, USA, October 27-28, 2016.
41. **Hu Ding**, Yu Liu, Lingxiao Huang, and Jian Li, “A Geometric Approach for K-Means Clustering with Distributed Dimensions,” *Joint STOC/SOCG Workshop on Geometry and Machine Learning*, Boston, MA, USA, June 18, 2016.
42. **H. Ding**, J. Xu, “FPTAS for Minimizing Earth Mover’s Distance under Rigid Transformations and Related Problems (abstract version),” *Fall Workshop on Computational Geometry (FWCG’14)*, Storrs, CT, USA, October 31-November 1, 2014.
43. **H. Ding**, J. Xu, “Chromatic Clustering in High Dimensional Space (abstract version),” *Fall Workshop on Computational Geometry (FWCG’12)*, College Park, MD, USA, November 9-10, 2012.

#### Talks and Presentations

- Invited speaker at “Emerging Topics in Computing Symposium” in conjunction with CSE 50th anniversary of SUNY at Buffalo, September, 2017, “Balanced k-Center Clustering When k is a Constant”.
- Invited speaker in Simons Institute of the Theory and Computing, UC Berkeley, June 2017, “Protein Mover’s Distance: A Geometric Approach for Global Alignment of PPI Networks”.
- **Seminar Talk** (invited speaker) in SUNY at Buffalo (April 2017) and Nanjing University (May 2017), “Novel Geometric Techniques for Reducing Communication Cost in Distributed Data Analysis”, .
- Invited for **One Hour Featured Talk** in Simons Center, SUNY Stony Brook, April 2017, “Simplex Lemma And The Applications in Data Analysis”.
- **Seminar Talk** (invited speaker) in University of Notre Dame, August 2016, “Geometry Meets Big Data: from Theory to Practice”.
- **Seminar Talk** (invited speaker) in Nanjing University (April 2015), Tsinghua University (September 2015), Zhongshan University (July 2016), “Novel Geometric Algorithms for Machine Learning Problems.”
- **Amazon Graduate Research Symposium** (invited speaker), Seattle, USA, November 2014, “Gauging Association Patterns of Chromosome Territories via Chromatic Median” .
- **China Theory Week** (invited speaker), Beijing, China, September 2014, “Sub-linear Time Hybrid Approximations for Least Trimmed Squares Estimator and Related Problems”.
- **Conference/Workshop presentations.** ESA’19, ESA’18, COCOA’17, CCCG’17, SoCG’16, SoCG’14, SODA’15, ICALP’11, CVPR’13, ICML’16, MOBIHOC’16, FWCG’12, FWCG’14, FWCG’16, WoGaML’16.

#### Honors and awards

- **NSF CRII (pre-CAREER) Award** 2017.
- **Simons-Berkeley Research Fellowship** for worldwide exceptional young computer scientists 2015-2016.
- **UB CSE Best Doctoral Dissertation Award** 2015, and nominated for ACM Doctoral Dissertation Award by SUNY Buffalo.

- The paper published in *Human Molecular Genetics* 2015 was recommended by F1000Prime as an Article of Special Significance to the research on 3D pattern of chromosome territories.
- Student travel award for attending *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2015.
- Awarded Cover Page for Research on Nor-Bearing Chromosome Interactions, *Journal of Cellular Physiology*, 230(2), 2015.
- Invited as the only student speaker on Machine Learning in North America to *Amazon Graduate Research Symposium*, 2014.
- As one of 30 top CS theory students worldwide, invited to attend *China Theory Week*, an invitation-only workshop, 2014.
- Honorable mention award, UB School of Engineering and Applied Sciences graduate student poster competition, 2014.
- Student travel award for attending *30th ACM Symposium on Computational Geometry (SoCG)*, 2014.
- Excellent graduate award, Sun Yat-Sen University, 2009.
- Outstanding student scholarship, Sun Yat-Sen University, 2006, 2007, and 2008.

### Current Students

- Manni Liu (Ph.D in computer science, from fall 2016 at MSU, co-supervising with Prof. Yunhao Liu)
- Mingyue Wang (Ph.D in computer science, from fall 2018)
- Wenjie Liu (Ph.D in computer science, from fall 2020)
- Qi Chen (Ph.D in data science, from fall 2020)
- Zixiu Wang (Master in computer science, from fall 2018)
- Fan Yang (Master in computer science, from fall 2019)
- Ruizhe Qin (Master in computer science, from fall 2019)
- Tan Chen (Master in data science, from fall 2019)
- Mengying Li (Master in data science, from fall 2019)
- Ruilong Yao (Master in computer science, from fall 2020)
- Ruomin Huang (Master in data science, from fall 2020)
- Jiawei Huang (Master in computer science, from fall 2020)
- Jinpeng Zhang (Master in data science, from fall 2020)
- Kai Liu (Master in computer science, from fall 2020)
- Xiaolei Li (Master in computer science, from fall 2020)

### Former Students

- Mingquan Ye (Master 2019 at MSU  $\rightarrow$  Ph.D at UIC)
- Haikuo Yu (Bachelor 2019 at USTC  $\rightarrow$  Master at USTC)

## Teaching

Courses at University of Science and Technology of China

- Algorithms for Big Data (undergraduate): Spring 2020.
- Discrete Mathematics (undergraduate): Fall 2019.
- Concrete Mathematics (Ph.D): Fall 2019.

Courses at Michigan State University

- **CSE 331** Algorithms and Data Structures: Fall 2016, Fall 2017.
- **CSE 891** Selected Topics: Geometric Algorithms for Machine Learning: Spring 2017, Spring 2018.

## Professional activities

- **Panelist:** National Science Foundation (NSF) 2017.
- **Committee member:** Fall Workshop on Computational Geometry (FWCG) 2015 and 2018, ACML 2017, ACM KDD 2018, 2019, 2020, BIGCOM 2018 (TPC Vice Co-chair), 2019, FAW 2019, TAMC 2020.
- **Conferences and Journals reviewer:** ACM-SIAM Symposium on Discrete Algorithms (SODA'16, SODA'17), IEEE Symposium on Foundations of Computer Science (FOCS'15), International Symposium on Computational Geometry (SoCG'17, SoCG'18), Advances in Neural Information Processing Systems (NIPS'14, NIPS'15), Symposium on Theoretical Aspects of Computer Science (STACS'12), Workshop on Algorithms and Computation (WALCOM'11), International Symposium on Algorithms and Computation (ISAAC'17, ISAAC'18), Workshop on Approximation and Online Algorithms (WAOA '17), International Frontiers of Algorithmic Workshop (FAW'10), Information Processing Letters (IPL), Theoretical Computer Science (TCS), Journal of Discrete Algorithms (JDA), Journal of Computer and System Sciences (JCSS), Algorithmica, ACM Transactions on Sensor Networks, PLoS One, Theory of Computing Systems.