

**Contact Information**

Department of Mathematics  
The University of Arizona  
Tucson, AZ 85721  
U.S.A.

Office: 520-621-2416  
Fax: 520-621-8322  
Email: [nhao@math.arizona.edu](mailto:nhao@math.arizona.edu)  
Web: <http://math.arizona.edu/~nhao/>

**Education**

2003 B.S. Mathematics Peking University, China  
2009 Ph.D. Mathematics Stony Brook University, U.S.A.

**Current Employment**

2019– Associate Professor Department of Mathematics, University of Arizona  
2010– Member GIDP in Statistics, University of Arizona

**Previous Employment**

2009–2010 Research Associate Statistics Lab, Department of ORFE, Princeton University  
2010–2013 Visiting Assistant Professor Department of Mathematics, University of Arizona  
2013–2019 Assistant Professor Department of Mathematics, University of Arizona

**Publications****Refereed Journal Articles**

1. Fan, J., Guo, S. and Hao, N. (2012), Variance Estimation Using Refitted Cross-Validation in Ultra-high Dimensional Regression, *Journal of the Royal Statistical Society: Series B*, 2012, **74**, Part 1, pp. 37-65.
2. Hao, N., Niu, Y.S. and Zhang, H. (2013), Multiple Change-Point Detection via a Screening and Ranking Algorithm, *Statistica Sinica*, 2013, **23**, pp. 1553-1572.
3. Hao, N. and Zhang, H.H. (2014), Interaction Screening for Ultra-High Dimensional Data, *Journal of the American Statistical Association*, 2014, **109**, pp. 1285-1301.
4. Hao, N., Dong, B. and Fan, J., (2015) Sparsifying the Fisher Linear Discriminant by Rotation, *Journal of the Royal Statistical Society: Series B*, 2015, **77**, Part 4, pp. 827-851.
5. Niu, Y.S., Hao, N. and Zhang, H. (2016) Multiple Change-point Detection: a Selective Overview, *Statistical Science*, 2016, **31**, pp. 611-623.
6. Hao, N. and Zhang, H.H. (2017), A Note on High Dimensional Linear Regression with Interactions, *The American Statistician*, 2017, **71**, Issue 4, pp. 291-297.
7. Hao, N. and Zhang, H.H. (2017), Oracle P-values and Variable Screening, *Electronic Journal of Statistics*, 2017, **11**, pp. 3251-3271.
8. Xiao, F., Niu, Y.S., Hao, N., Xu, Y., Jin, Z. and Zhang, H. (2017), modSaRa: a computationally efficient R package for CNV identification, *Bioinformatics*, 2017, **33**, Issue 15, pp. 2384-2385.
9. Niu, Y.S., Hao, N. and Dong B. (2018), A New Reduced-Rank Linear Discriminant Analysis Method and Its Applications, *Statistica Sinica*, 2018, **28**, pp. 189-202.
10. Niu, Y.S., Hao, N. and Zhang, H.H. (2018), Interaction Screening by Partial Correlation, *Statistics and Its Interface*, 2018, **11**, pp. 317-325.
11. Hao, N., Feng, Y. and Zhang, H.H. (2018), Model Selection for High Dimensional Quadratic Regressions via Regularization, *Journal of the American Statistical Association*, 2018, **113**, pp. 615-625.
12. Xiao, F., Luo, X., Hao, N., Niu, Y.S., Xiao, X., Cai, G., Amos, C.I., and Zhang, H. (2019) An Accurate and Powerful Method for Copy Number Variation Detection, *Bioinformatics*, *Bioinformatics*, **35(17)**, pp. 2891-2898.

13. Shin, S.J., Wu, Y. and Hao, N. (2020), A Backward Procedure for Change-point Detection with Application to Copy Number Variation Detection. *The Canadian Journal of Statistics*, **48**, pp. 366-385.
14. Hao, N., Niu, Y.S., Xiao, F. and Zhang, H. (2021) A Super Scalable Algorithm for Short Segment Detection. *Statistics in Biosciences*, **13**, pp. 18-33.
15. Wu, R. and Hao, N. (2022) Quadratic Discriminant Analysis by Projection. *Journal of Multivariate Analysis*, **190**.
16. Lu, Z., Hao, N., and Zhang, H.H. (2023) Simultaneous Change-point Detection and Curve Estimation. To appear *Statistics and Its Interface*.

#### Refereed Conference Articles

17. Niu, Y.S., Hao, N. and An, L. (2011), Detection of Rare Functional Variants Using Group ISIS, *BMC Proceedings*, 2011, **5**(Suppl 9):S108.
18. Dong, B. and Hao, N. (2015) Semi-supervised High Dimensional Clustering by Tight Wavelet Frames, *SPIE Optical Engineering+ Applications*.

#### Scientific Products/Software

19. Hao, N., Niu, Y.S. and Zhang, H. (2013) R Package **SaRa**.
20. Niu, Y.S., Hao, N. and Dong B. (2015) R Package **SPCALDA**.
21. Feng, Y., Hao, N. and Zhang, H.H. (2015) R Package **RAMP**.
22. Xiao, F., Niu, Y.S., Hao, N., Xu, Y., Jin, Z. and Zhang, H. (2016) R Package **modSaRa**.
23. Hao, N., Niu, Y.S., Xiao, F. and Zhang, H. (2018) R Package **SSSS**.
24. Xiao, F., Luo, X., Hao, N., Niu, Y.S., Xiao, X., Cai, G., Amos, C.I., and Zhang, H. (2018) R Package **modSaRa2**.
25. Shin, S.J., Wu, Y. and Hao, N. (2018) R Package **bwd**.
26. Lu, Z., Hao, N., and Zhang, H.H. (2023) R Package **SCHACE**.

#### Manuscripts

27. Hao, N., Niu, Y.S., and Xiao, H. Equivariant Variance Estimation for Multiple Change-point Model. Under review.
28. Zhao, Y., Hao, N., and Zhu, J. Variational Estimators of the Degree-corrected Latent Block Model for Bipartite Networks. Under review.

#### Awarded Grants

1. Simons Foundation: AMS Simons Travel Grant 2012-2014  
Total Awarded: \$4,000  
**Role: sole PI**
2. National Science Foundation: DMS-1309507 2013-2017  
"Flexible modeling for high-dimensional complex data: theory, methodology, and computation"  
Total Awarded: \$150,000, PI: Hao Zhang.  
**Role: Co-PI**
3. National Science Foundation (NSF) Grant: DMS-1722691 2017-2020  
"Collaborative research: scalable and flexible algorithms to detect structural change in complex sequence data"  
Total Awarded: \$165,996, PI: Yue Niu.  
**Role: Co-PI**

4. Simons Foundation: Collaboration Grants for Mathematicians 524432 2017-2022  
 “Scalable methods in high dimensional statistical learning”  
 Total Awarded: \$42,000.  
**Role: sole PI**
5. National Science Foundation (NSF) Grant: DMS-1937229 2020-2025  
 “RTG: Applied Mathematics and Statistics for Data-Driven Discovery”  
 Total Awarded: \$1,252,358, PI: Kevin Lin.  
**Role: SP**
6. National Science Foundation (NSF) Grant: 2245381 2023-2026  
 “Collaborative Research: CDS&E-MSS: Community detection via covariance structures”  
 Total Awarded: \$40,000.  
**Role: PI**

## Service

- Editorial Board
 

2022-	Editor	Stat
2023-	Associate Editor	Journal of the American Statistical Association
2019-2022	Associate Editor	Stat
- Professional Society Services
 

2019-2021	Member, Award committee, International Chinese Statistical Association
2022-2023	Advisory Board, the American Statistical Association, Arizona Chapter.
2022-2023	SLDS Student Paper Award Committee.
- Conference Organizational Activities
 

2010	Session Chair	Joint Statistical Meetings, Vancouver, Canada.
2015	Session Organizer	ICSA China Statistics Conference, Shanghai, China.
2016	Session Organizer&Chair	The 10th ICSA International Conference, Shanghai, China.
2018	Session Organizer&Chair	TRIPODS Southwest Summer Conference, Biosphere 2, AZ.
2018	Session Organizer	ICSA Applied Statistics Symposium, New Brunswick, NJ.
2018	Session Organizer	Joint Statistical Meetings, Vancouver, Canada.
2019	Session Chair	International Conference on Frontiers of Data Science, Hangzhou, China.
2019	Session Organizer&Chair	ICSA China Statistics Conference, Tianjin, China.
2021	Session Organizer&Chair	WNAR 2021 Conference, Anchorage, Alaska. (Virtual due to COVID)
2023	Session Organizer&Chair	Joint Statistical Meetings, Toronto, Canada.
- Referee service: Annals of Statistics; Journal of the American Statistical Association; Journal of the Royal Statistical Society: Series B; Biometrika; Biometrics; Bernoulli; Journal of Computational and Graphical Statistics; Journal of Multivariate Analysis; Statistica Sinica; Technometrics; Test; Journal of Machine Learning Research; Journal of Econometrics; Journal of Business and Economic Statistics; Electronic Journal of Statistics; Statistics in Medicine; Statistics and its Interface; Statistics & Probability Letters; Computational Statistics and Data Analysis; Statistical Analysis & Data Mining; Physica A; Stat; Metrika; Communication in Statistics; Computational Statistics; Journal of Applied Statistics; Genetic Epidemiology; Nucleic Acids Research; Ecography; Frontiers in Statistical Genetics and Methodology; Earth and Space Science; Journal of Probability and Statistics.
- National Science Foundation: Panelist (2019).
- Departmental committees

2013-2015	Member, Graduate Admissions Committee, GIDP in Statistics
2014	Member, Progress Report Committee, GIDP in Statistics
2015-2016	Member, Academic Program Review Self-Study Committee, GIDP in Statistics
2017-2018	Member, Undergraduate Committee, Department of Mathematics
2017-2018	Member, Planning Committee, Department of Mathematics
2017-2020	Co-leader, Research Working Group 6, UA TRIPODS
2018-2019	Member, Graduate Committee, Department of Mathematics
2020-2022	Member, Computer Committee, Department of Mathematics
2020-2022	Member, Personnel Committee, Department of Mathematics
2021	Member, Graduate Admissions Committee, GIDP in Statistics and Data Science
2021-2024	Member, Executive Committee, GIDP in Statistics and Data Science
2021-2024	Organizer, Statistics and Data Science Colloquium
2022-2024	Member, Graduate Committee, Department of Mathematics

## Outreach

- K-12 Education
  - 2019– 2020 Coach, Math club, Sunrise Drive Elementary School, Tucson, AZ
  - 2020– 2021 Coach, Math club, Catalina Foothills School District, Tucson, AZ

## Conferences/Scholarly Presentations

### Colloquia and Seminars

1. “Multiple Change-Point Detection via a Screening and Ranking Algorithm”, Statistics GIDP Colloquium, University of Arizona, Tucson, AZ, Mar. 2012
2. “An Introduction to High Dimensional Statistical Learning”, Sichuan University, Chengdu, Sichuan, China, Jul. 2012
3. “Selection of Interaction Effects for Ultra-High Dimensional Data”, Colloquium, Southwestern University of Finance and Economics, Chengdu, Sichuan, China, Jul. 2012
4. “Identify Interactions for Ultra-High Dimensional Data”, Colloquium, Department of Statistics & Biostatistics, Rutgers University, Piscataway, NJ, Nov. 2012
5. “Equivariant Estimators in High Dimensional Models”, Modeling and Computation Seminar, Department of Mathematics, University of Arizona, Tucson, AZ, Nov. 2012
6. “Identify Interactions for High Dimensional Data”, Colloquium, Department of Mathematics, Tulane University, New Orleans, LA, Jan. 2013
7. “Identify Interactions for High Dimensional Data”, Seminar, Department of Statistics, Chinese University of Hong Kong, Hong Kong, Feb. 2013
8. “Identify Interactions for High Dimensional Data”, Seminar, Department of Management Sciences, City University of Hong Kong, Hong Kong, Feb. 2013
9. “Identify Interactions for High Dimensional Data”, Statistics Seminar, Department of Mathematical Sciences, New Jersey Institute of Technology, Newark, NJ, Feb. 2013
10. “Identify Interactions for High Dimensional Data”, Colloquium, School of Mathematical and Statistical Sciences, Arizona State University, Tempe, AZ, Feb. 2013
11. “Identify Interactions for High Dimensional Data”, Colloquium, Department of Mathematics, University of Arizona, Tucson, AZ, Feb. 2013
12. “A Rotational Approach to High Dimensional Classification”, Seminar, Institute of Applied Mathematics, AMSS, CAS, Beijing, China, Jun. 2013
13. “A Rotational Approach to High Dimensional Classification”, Seminar, Center for Statistical Science, Peking University, Beijing, China, Jun. 2013

14. “Reduced-Rank Linear Discriminant Analysis”, Biostatistics Seminar, Yale School of Public Health, New Haven, Aug. 2015
15. “Recent Developments on Multiple Change-point Detection”, Seminar, School of Economics, Shanghai University of Finance and Economics, Shanghai, China, Dec. 2016
16. “Model Selection for High Dimensional Quadratic Regression Models”, Statistics Colloquium, Center for Statistical Science, Tsinghua University, Beijing, China, Dec. 2016
17. “Recent Developments on Multiple Change-point Detection”, Seminar, Institute of Statistics and Big Data, Renmin University of China, Beijing, China, Jan. 2017
18. “Simultaneous Inference for Multiple Change points”, Statistics Seminar, School of Mathematical and Statistical Sciences, Arizona State University, Tempe, AZ, Oct. 2017
19. “Overview of Statistical Dimension Reduction Techniques”, UA TRIPODS Seminar, University of Arizona, Tucson, AZ, Nov. 2017
20. “An Introduction to Statistical Research”, Research Tutorial Groups Seminar, Department of Mathematics, University of Arizona, Tucson, AZ, Mar. 2018
21. “A Super Scalable Algorithm for Short Segment Detection”, Statistics Colloquium, University of Arizona, Tucson, AZ, Oct. 2018
22. “Geometry of Intervals”, Undergraduate Research Seminar, University of Arizona, Tucson, AZ, Nov. 2018
23. “A Super Scalable Algorithm for Short Segment Detection”, Seminar, Chinese Academy of Sciences, Beijing, China, Jun. 2019
24. “Variance Estimation for Complex models”, MNS Seminar at New College, Arizona State University West, Phoenix, Sep. 2019
25. “Equivariant Variance estimation for multiple change-point model”, Statistics and Data Science Seminar, University of Illinois at Chicago, Oct. 2019

#### **Invited Talks in Conferences and Symposia**

26. “Variance Estimation Using Refitted Cross-Validation in Ultrahigh Dimensional Regression”, 2010 Joint Statistical Meetings, Vancouver, Canada, Aug. 2010
27. “The Screening and Ranking Algorithm to Detect DNA Copy Number Variations”, ICSA 2011 Applied Statistics Symposium, New York City, NY, Jun. 2011
28. “Selection of Interaction Effects for Ultra-High Dimensional Data”, Conference on Statistical Learning and Data Mining, University of Michigan, Ann Arbor, MI, Jun. 2012
29. “An FDR Approach for Multiple Change-Point Detection”, ENAR 2013 Spring Meeting, Orlando, FL, Mar. 2013
30. “Identify Interactions for High Dimensional Data”, IMS-China International Conference on Statistics and Probability, Chengdu, Sichuan, China, Jul. 2013
31. “Statistical Methods for Detection and Analysis of Copy Number Variations”, The 59th World Statistics Congress, Hong Kong, China, Aug. 2013
32. “New Methods for Interaction Selection”, 2014 ICSA and KISS Joint Applied Statistics Symposium, Portland, Oregon, Jun. 2014
33. “A Rotate-and-Solve Procedure for High Dimensional Classification”, Conference on Statistical Learning and Data Science, University of North Carolina at Chapel Hill, NC, Jun. 2016
34. “A Rotate-and-Solve Procedure for High Dimensional Classification”, 2016 ICSA Applied Statistics Symposium, Atlanta, GA, Jun. 2016
35. “False Discovery Rate Control for Multiple Change-point Detection”, The 10th ICSA international conference, Shanghai, China, Dec. 2016

36. “Simultaneous Inference for Multiple Change points”, 2017 ICSA Applied Statistics Symposium, Chicago, IL, Jun. 2017
37. “Dimension Reduction via Quadratic Discriminant Analysis”, 2018 ICSA China Conference with the Focus on Data Science, Qingdao, China, Jul. 2018
38. “Model Selection for High Dimensional Quadratic Regression Models”, MJU First International workshop on data science, Fuzhou, China, Jul. 2018
39. “Oracle P-values and Variable Screening”, 2019 Hangzhou International Conference on Frontiers of Data Science, Hangzhou, China, May 2019
40. “A Backward Procedure for Change-point Detection with Applications to Copy Number Variation Detection”, 2019 ICSA China Conference, Tianjin, China, Jul. 2019
41. “A Super Scalable Algorithm for Short Segment Detection”, Machine Learning Day at Arizona State University, Apr. 2020 (canceled due to COVID)
42. “Quadratic Discriminant Analysis by Projection”, 2020 ICSA China Conference, Wuhan, China, Jul. 2020 (canceled due to COVID)
43. “Quadratic Discriminant Analysis by Projection”, EcoSta 2020, Seoul, Korea, Jul. 2020 (canceled due to COVID)
44. “Equivariant Variance Estimation for Multiple Change-point Model”, 2021 ICSA China Conference, Xi’an, China, Jul. 2021 (canceled due to COVID)
45. “Equivariant Variance Estimation for Multiple Change-point Model”, 10th World Congress in Probability and Statistics, Virtual/Seoul, Korea, Jul. 2021
46. “Equivariant Variance Estimation for Multiple Change-point Model”, 2021 ICSA Applied Statistics Symposium, Virtual, Sep. 2021
47. “Quadratic Discriminant Analysis by Projection”, 2022 ICSA Applied Statistics Symposium, Gainesville, FL, Jun. 2022
48. “Quadratic Discriminant Analysis by Projection”, ICSA-Canada Chapter Symposium 2022, Banff, Canada, Jul. 2022
49. “Simultaneous Change-point Detection and Curve Estimation”, WNAR 2023 Conference, Anchorage, Alaska, Jun. 2023

#### **Contributed Conference Talk**

50. “Group Iterative Sure Independence Screening”, ENAR 2011 Spring Meeting, Miami, FL, Mar. 2011

#### **Poster**

51. “Interaction Screening for Ultra-High Dimensional Data”, 14th Meeting of New Researchers in Statistics and Probability, San Diego, CA, Jul. 2012

#### **Student Advisory**

##### **Ph.D. Dissertations Directed (Completed)**

1. Yue Zeng (Ph.D. 2017), “Variable Screening in Multi-Category Classification for Ultra-High Dimensional Data”. GIDP in Statistics, University of Arizona, (co-advised with Hao Helen Zhang). First job: Statistician, Puma Biotechnology.
2. Ruiyang Wu (Ph.D. 2022), “New Dimension Reduction Methods for Quadratic Discriminant Analysis”. Department of Mathematics, University of Arizona. First job: Postdoc, Department of Biostatistics, New York University.
3. Zhaoying Lu (Ph.D. 2023), “Simultaneous Change-point Detection and Curve Estimation for Single and Multiple Sequential Data”. GIDP in Statistics and Data Science, University of Arizona, (co-advised with Hao Helen Zhang). First job: Biostatistician, Nemours.

4. Wenbo Ouyang (Ph.D. 2023), “Dynamic Supervised Principal Component Analysis for Classification”. GIDP in Statistics and Data Science, University of Arizona, (co-advised with Hao Helen Zhang). First job: Data Scientist, Navy Federal Credit Union.

#### **Ph.D. Dissertations Directed (In-Progress)**

5. Xiyang Mo, GIDP in Statistics and Data Science, University of Arizona, 2022- (co-advised with Yue Selena Niu).
6. John Park, Department of Mathematics, University of Arizona, 2022-.
7. Ziyang Liu, GIDP in Statistics and Data Science, University of Arizona, 2022- (co-advised with Hongxu Ding).
8. Jeffrey Mei, GIDP in Statistics and Data Science, University of Arizona, 2022- (co-advised with Yue Selena Niu).

#### **Master Students (Chair)**

1. Ruoyu Huang (2016), GIDP in Statistics, University of Arizona.

#### **Graduate Students (Dissertation Committee Member)**

1. Tugce Koc (Ph.D. in progress), Department of Mathematics, University of Arizona.
2. Duncan Bennett (Ph.D. in progress), Department of Mathematics, University of Arizona.
3. Ah Young Kim (Ph.D. 2023), GIDP in Statistics and Data Science, University of Arizona.
4. Derick J. Bishop (Ph.D. 2022), GIDP in Statistics and Data Science, University of Arizona.
5. Liyun Zeng (Ph.D. 2022), GIDP in Statistics and Data Science, University of Arizona.
6. Kyungmi Chung (Ph.D. 2021), GIDP in Statistics and Data Science, University of Arizona.
7. Meng Lu (Ph.D. 2020), GIDP in Statistics, University of Arizona.
8. Sylvain Lacaze (Ph.D. 2015), Department of Aerospace and Mechanical Engineering, University of Arizona.
9. Duncan Bennett (M.S. 2022), Department of Mathematics, University of Arizona.
10. Drew Baldwin (M.S. 2020), GIDP in Statistics and Data Science, University of Arizona.
11. Jing Li (M.S. 2018), GIDP in Statistics, University of Arizona.
12. Ahmad Hakeem Abdul Wahab (M.S. 2015), GIDP in Statistics, University of Arizona.

#### **Undergraduate Students (Honor Thesis Advisor)**

1. Malin Elisabeth Rapp-Olsson (2013).

#### **Undergraduate Students via NSF-REU program**

1. Sophia Wang (2019). REU under NSF-CCF-1740858.
2. Alex Dunn (2021). REU under NSF-DMS-1937229.

#### **Professional Membership**

International Chinese Statistical Association (ICSA)

American Statistical Association (ASA)

Western North American Region of The International Biometric Society (WNAR)

## Teaching Experience

The University of Arizona

- DATA 375 *Introduction to Statistical Computing*, Spring 2019, Fall 2021, Spring 2022, Fall 2022, Fall 2023
- MATH 125 *Calculus I*, Fall 2012
- MATH 129 *Calculus II*, Spring 2013, Spring 2014, Fall 2016, Spring 2017, Spring 2019, Fall 2020
- MATH 263 *Introduction to Statistics and Biostatistics*, Fall 2010, Fall 2015, Spring 2016
- MATH 363 *Introduction to Statistical Methods*, Fall 2017
- MATH 466 *Theory of Statistics*, Fall 2011, Fall 2017
- MATH 529 *Topics in Modern Analysis (Multivariate Statistics)*, Spring 2015
- MATH/STAT 567A *Theoretical Statistics I*, Spring 2014, Spring 2016, Spring 2018, Fall 2020, Fall 2022
- MATH/STAT 567B *Theoretical Statistics II*, Fall 2018, Spring 2021, Spring 2023
- STAT 675 *Statistical Computing*, Spring 2011, Spring 2012