

Haozhe Zhang

DATA & APPLIED SCIENTIST, PH.D. IN STATISTICS

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PROFESSIONAL INTERESTS	Diagnostics and Uncertainty Quantification of Machine Learning Algorithms, Functional Data Analysis, Large-scale Data Analysis, Predictive Analytics, Causal Inference, Nonlinear Dimensionality Reduction, and Interdisciplinary Quantitative Research.
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EDUCATION	Iowa State University, Ames, IA <i>Doctor of Philosophy, Statistics</i> Dissertation: Topics in functional data analysis and machine learning predictive inference Advisors: Prof. Dan Nettleton and Prof. Yehua Li 8/2014 - 5/2019
	Iowa State University, Ames, IA <i>Master of Science, Statistics</i> Advisor: Prof. Zhengyuan Zhu 8/2014 - 5/2016
	University of Science and Technology of China, Hefei, China School of the Gifted Young Hua Loo-Keng Talent Program in Mathematics <i>Bachelor of Science, Statistics</i> 8/2010 - 6/2014
	National Taiwan University, Taipei Department of Mathematics <i>Exchange Student</i> Fall 2012

PROFESSIONAL EXPERIENCE	Laurence H. Baker Center for Bioinformatics and Biological Statistics, Ames, IA <i>Research Assistant</i> 5/2015 - 05/2019 <ul style="list-style-type: none">- Build predictive models using machine learning algorithms to forecast crop yields in US Midwest.- Develop methodologies that quantify the uncertainty of predictions from bagging methods (e.g. Random Forests), and develop regression-enhanced random forest to improve forecasting accuracy.- Analyze genomic, phenotypic, and environmental data from agricultural and biological sciences.
	eBay Inc., San Jose, CA <i>Data Scientist Intern</i> Summer 2018 <ul style="list-style-type: none">- Develop large-scale graph-based semisupervised learning algorithm utilizing label propagation for look-alike system of eBay ads business.- Design and perform back test and online A/B test for the proposed graph-based recommendation system and classic SVD-based collaborative filtering.
	Department of Statistics, Iowa State University, Ames, IA <i>Teaching Assistant</i> 8/2017 - 5/2018 <ul style="list-style-type: none">- Lab Instructor of STAT 101 (Principle of Statistics) in the fall semester.- Lab Instructor of STAT 326 (Introductory Business Statistics II) in the spring semester.
	Liberty Mutual, Boston, MA <i>Data Scientist Intern</i> Summer 2017 <ul style="list-style-type: none">- Develop and test deep neural networks (CNN, LSTM, ResNet, U-net etc.) for telematics data (i.e., vehicle GPS data) using MXNet and Tensorflow.

- Compare the performance of deep learning with state-of-art machine learning methods such as gradient boosting and explore ensemble opportunities.
- Test and improve Amazon Website Service (AWS) based deep learning platform.

Center for Survey Statistics and Methodology, Ames, IA
Research Assistant

8/2014 - 6/2016

- Work on interdisciplinary survey sampling projects, including National Resources Inventory (NRI) and Conservation Effects Assessment (CEA) projects.
- Use image-to-image neural network to predict landuse categories on remote sensing data.

Okinawa Institute of Science and Technology, Okinawa, Japan
Research Intern

Summer 2013, Winter 2012

- Analyze satellite image data and 3D neuron data using Python (scipy, numpy), and Investigate the spatial-temporal pattern of fairy circle point processes.
- Build a probabilistic model for geometric patterns of neuron bifurcations.

SUBMITTED MANUSCRIPTS AND PREPRINTS

- **Zhang, H.**, and Li, Y. (2019+). "Spatially Dependent Functional Data: Covariance Estimation, Principal Component Analysis, and Kriging". Submitted to *The Annals of Statistics*.
- Liang, D., **Zhang, H.**, Chang, X., and Huang, H. (2019+). "Modeling and Regionalization of China's PM_{2.5} Using Spatial-Functional Mixture Model". Submitted to *Journal of the American Statistical Association*.
- **Zhang, H.**, Nettleton, D., Hey, S., Jubery, Z., Yeh, C.T., and Schnable, P. (2019+). "Estimating Plant Growth Curves and Derivatives by Modeling Crowdsourced Imaged-based Data". Preprint.

PUBLICATIONS

- **Zhang, H.**, Zimmerman, J., Nettleton, D., and Nordman, D.J. (2019+). "Random Forest Prediction Intervals". *The American Statistician*. DOI: 10.1080/00031305.2019.1585288.
- Guo, T., Yu, X., Li, X., **Zhang, H.**, Zhu, C., Flint-Garcia, S., McMullen, M., Szalma, S., Holland J., Wissner, R., and Yu, J. (2019). "Optimal Designs for Genomic Selection in Hybrid Crops". *Molecular Plant*, 12(3):390-401. DOI:10.1016/j.molp.2018.12.022.
- **Zhang, H.**, Nettleton, and D., Zhu, Z. (2017). "Regression-Enhanced Random Forests". In JSM Proceedings, Section on Statistical Learning and Data Science, Alexandria, VA: American Statistical Association. 636 – 647.
- **Zhang, H.**, Zhu, Z., and Yin, S. (2016). "Identifying Precipitation Regimes in China Using Model-based Clustering of Spatial Functional data". *Proceedings of the Sixth International Workshop on Climate Informatics*, pages 117–120. DOI:10.5065/d6k072n6.
- He, Z., Zhang, M., and **Zhang, H.** (2016). "Data-driven Research on Chemical Features of Jingdezhen and Longquan Celadon by Energy Dispersive X-ray Fluorescence". *Ceramics International*, 42(4):5123–5129. DOI: 10.1016/j.ceramint.2015.12.030.
- Liang, X., Zou, T., Guo, B., Li, S., **Zhang, H.**, Zhang, S., Huang, H., and Chen, S.X. (2015). "Assessing Beijing's PM_{2.5} Pollution: Severity, Impacts of Weather, APEC and Winter Heating". *Proceedings of the Royal Society A*, 471(2182). DOI: 10.1098/rspa.2015.0257.

UNPUBLISHED MANUSCRIPTS

- **Zhang, H.**, and Sinclair, R. (2015). "Namibian Fairy Circles and Epithelial Cells Share Emergent Geometric Order". *Ecological Complexity*, 22:32-35. DOI:10.1016/j.ecocom.2015.02.001.
- **Zhang, H.** (2019). "Topics in Functional Data Analysis and Machine Learning Predictive Inference". *PhD Thesis*. <https://lib.dr.iastate.edu/etd/16800>.
- Liang, X., Zou, T., Guo, B., Li, S., **Zhang, H.**, Zhang, S., Huang, H., and Chen, S.X. (2015). "Air Quality Assessment Report I: Statistical Analysis of Beijing". *Technical Report (in Chinese)*, 2015.

INVITED TALKS & POSTERS

* Denotes presenter.

- **Zhang, H.**, Qu, Y., and Kirmani, S.* "Constructing a Graph from User Implicit Feedback". In: 2019 SIAM Conference on Computational Science and Engineering (CSE19), Spokane, WA, February 2019.
- **Zhang, H.***, Nettleton, D., and Nordman, D.J. "Random Forest Prediction Intervals". In: Data Science and Analytic Team at Facebook, Menlo Park, CA, January 2019.
- **Zhang, H.***, and Li, Y. "Spatially Dependent Functional Data: Covariance Estimation, Principal Component Analysis, and Prediction". In: Department of Mathematics and Statistics, University of New Hampshire, Durham, NH, December 2018.
- **Zhang, H.***, and Li, Y. "Spatially Dependent Functional Data: Covariance Estimation, Principal Component Analysis, and Prediction". In: School of Mathematics and Statistics, University of Melbourne, Melbourne, Australia, December 2018.

CONTRIBUTED TALKS & POSTERS

- **Zhang, H.**, and Li, Y. "On the Covariance Estimation and Principal Component Analysis for Spatially Dependent Functional Data". In: Joint Statistical Meetings, Vancouver, Canada, August 2018.
- **Zhang, H.***, Nettleton, D., and Nordman, D.J. "Random Forest Prediction Intervals". In: Symposium on Data Science and Statistics, Reston, Virginia, May 2018.
- **Zhang, H.***, and Li, Y. "On the Covariance Estimation and Principal Component Analysis for Spatially Dependent Functional Data". In: ENAR Spring Meeting, Atlanta, Georgia, March 2018.
- **Zhang, H.***, Nettleton, D., and Zhu, Z. (2017). "Regression-Enhanced Random Forests". In: Joint Statistical Meetings, Baltimore, Maryland, August 2017.
- **Zhang, H.***, and Nettleton, D. "Prediction-Guided Statistical Ranking of Maize Seed Brands". In: Symposium on Predictive Crop Design: Genome-to-Phenome, Lincoln, Nebraska, April 2017.
- **Zhang, H.***, and Zhu, Z. "Clustering Multiscale Spatial Functional Data with Application to Precipitation Regimes Identification". In: the 6th International Workshop on Climate Informatics, Boulder, Colorado, September 2016.
- **Zhang, H.***, and Zhu, Z. "Clustering Multiscale Spatial Functional Data with Application to Precipitation Regimes Identification". In: Workshop on Bayesian environmetrics, Columbus, Ohio, March 2016.

SELECTED AWARDS & HONORS

- **Student & Early Career Travel Award**, 2019. Travel fund for presenting an e-poster in the 2019 Symposium on Data Science and Statistics in Bellevue, Washington.
- **SAMSI Travel Award**, 2018. Travel fund for presenting a paper in the Symposium on Data Science and Statistics in Reston, Virginia.
- Travel support from ASA Section for Statistical Programmers and Analysts, 2017-18.
- **The George W. Snedecor Award**, Department of Statistics, Iowa State University, 2016. This award is for the most outstanding Ph.D. candidate in the department.
- **Climate Informatics Travel Fellowship Award**, 2016. Travel fund for giving a spotlight oral presentation in the 6th International Workshop on Climate Informatics, Boulder, CO.
- **The Holly C. and E. Beth Fryer Award**, Department of Statistics, Iowa State University, 2015. This award is for a top second-year Ph.D. student in the department.
- **2nd Place and 5th Place at Data Mining Cup 2016**, Prudsys AG, Berlin, Germany.
- **Presidential Scholars Fellowship**, Iowa State University, 2014.
- **National Scholarship of China**, Ministry of Education of the People's Republic of China, 2013. This award is for outstanding undergraduate students in China.
- **Outstanding Student Scholarship**, School of the Gifted Young, University of Science and Technology of China, 2012.
- **National Encouragement Scholarship**, School of the Gifted Young, University of Science and Technology of China, 2011.

PROGRAMMING SKILLS

- **Projects in:** Python, R, SQL, C/C++, Hive, Hadoop, Matlab, LATEX.
- **Familiar with:** Unix shell, SAS, HTML.
- **IDEs:** vi/vim, Visual Studio, PyCharm, Jupiter.

SERVICE AND LEADERSHIP

- Session Chair, *Spatial and Spatiotemporal Modeling in Climate and Meteorology*, Section on Statistics and the Environment, Joint Statistical Meetings 2019.
 - Program Committee Member, Artificial Intelligence Section, 2019 Grace Hopper Celebration of Women in Computing.
 - Reviewer for *Statistica Sinica* (1), *IEEE Transactions on Knowledge and Data Engineering* (1), *Stat* (1), and *PeerJ* (3).
 - International Student Advisory Board, Iowa State University, 2018.
 - Computation Advisory Committee, Department of Statistics, Iowa State University, 2017.
 - President of the Iowa STAT-ers, 2017-18.
 - Treasurer of the Iowa STAT-ers, 2016-17.
 - Graduate and Professional Student Senate, Iowa State University, 2015-16.
 - Student Assistant, Office of International Affairs, University of Science and Technology of China, 2013-14.
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PROFESSIONAL AFFILIATION

- American Statistical Association (ASA), Member, 2014 - Present
 - Association for Computing Machinery (ACM), Member, 2019 - Present
 - Institute of Mathematical Statistics (IMS), Member, 2014 - Present
 - International Chinese Statistical Association (ICSA), Member, 2015 - Present
 - Society for Industrial and Applied Mathematics (SIAM), Member, 2017 - Present
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REFERENCE

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