Shih–Kang Chao

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CONTACT INFORMATION

Department of Statistics
University of Missouri
146 Middlebush Hall
Columbia, MO 65211-6100

☎: 573-882-1577
FAX: 573-884-5524
✉: chaosh@missouri.edu
: http://faculty.missouri.edu/~chaosh

RESEARCH INTERESTS

The main thrust of my research is resource-aware statistical inference/machine learning. My current focuses are sparse deep neural networks with theoretical guarantees, distributed inference and computation (for big data) and risk-averse online decision making.

EDUCATION

Ph.D. Statistics, June 2015, School of Business and Economics, Humboldt University of Berlin, Germany (Advisors: Wolfgang K. Härdle and Vladimir Spokoiny)
M.B.A. Mathematical Finance, June 2011, National Taiwan University, Taipei, Taiwan
B.A. Finance; *Minor Mathematics*, June 2008, National Taiwan University, Taipei, Taiwan

ACADEMIC EXPERIENCE

Department of Statistics, University of Missouri, Columbia MO, U.S.A.
Assistant Professor (tenure-track) **Aug 2018 –**

Department of Statistics, Purdue University, West Lafayette IN, U.S.A.
Postdoctoral Fellow & Visiting Assistant Professor **Aug 2015 – Aug 2018**

ORFE, Princeton University, Princeton NJ, U.S.A.
Visiting Scholar **Nov 2014 – Feb 2015**

Humboldt University of Berlin, Berlin, Germany
Graduate Student **Oct 2011 – Jun 2015**
Instructor and Teaching Assistant **Apr 2012 – Jul 2015**

HONORS AND AWARDS

Winemiller Excellence Award, 2020
IMS NRC Travel Award, 2017
IMS Travel Award, 2016
Scholarship of BDPEMS, Germany, 2011-2014
Fellowship of the Phi Tau Phi Scholastic Honor Society, Republic of China (Taiwan), 2011

PUBLICATIONS. [GOOGLE SCHOLAR]

Kim, K. H., **Chao, S.–K.** and Härdle, W. (2021). Simultaneous Inference of Partially Linear Error-in-Covariate Models: an Application to the U.S. Gasoline Demand. *Journal of Statistical Planning and Inference*, 213: 93-105. [pdf]

Chao, S.–K., Wang, Z., Xing Y. and Cheng, G. (2020). Directional pruning of deep neural networks. *NeurIPS 2020*. [pdf]

Chao, S.–K., Härdle, W. and Yuan, M. (2020). Factorisable Multi-Task Quantile Regression, arXiv: 1507.03833. To appear in *Econometric Theory*. [pdf]

Yu, Y., **Chao, S.–K.**, Cheng, G. (2020). Simultaneous inference for massive data: distributed bootstrap. *ICML 2020* (acceptance rate: 21.8%). [pdf]

Wang B. Z., Sheen, J., Trück, S., **Chao, S.–K.** and Härdle, W. (2020) A note on the impact of news on US household inflation expectations. *Macroeconomic Dynamics*, 24(4): 995-1015. [pdf]

Volgushev, S., **Chao, S.–K.**, and Cheng, G. (2019) Distributed inference for quantile regression processes. *Annals of Statistics*, 47(3): 1634-1662. arXiv: 1701.06088 [pdf]

Chao, S.–K., Härdle, W. and Huang, C. (2018). Multivariate Factorizable Expectile Regression with Application to fMRI Data, *Computational Statistics & Data Analysis*, 121: 1-19. [pdf]

Chao, S.–K., Volgushev, S. and Cheng, G. (2017). Quantile Process for Semi and Nonparametric Regression Models, *Electronic Journal of Statistics*, 11(2): 3272-3331. [pdf]

Chao, S.–K., Proksch, K., Dette, H. and Härdle, W. (2017). Confidence corridors for nonparametric multivariate generalized quantile regression, *Journal of Business and Economic Statistics*, 35(1): 70-85. [pdf][R code]

Chao, S.–K. and Cheng G. (2016). Discussion on "Of quantiles and expectiles: consistent scoring functions, Choquet representations and forecast rankings" by Werner Ehm, Tilmann Gneiting, Alexander Jordan and Fabian Krüger, *J. R. Statist. Soc. B*, 78(3) 540-542. [pdf]

Chao, S.–K., Härdle, W. and Wang, W. (2014). Quantile Regression in Risk Calibration, in Lee, C.-F., and Lee, J. C. (eds), *Handbook of Financial Econometrics and Statistics*, Springer, New York. [pdf]

Working Papers

Yu, Y., **Chao, S.–K.** and Cheng, G. (2021). Distributed Bootstrap for Simultaneous Inference Under High Dimensionality, arXiv: 2102.10080. [pdf]

Chao, S.–K. and Cheng, G. (2019). A generalization of regularized dual averaging, arXiv: 1909.10072. [pdf]

Chao, S.–K., Ning, Y. and Liu, H. (2015). On High-Dimensional Predictive Confidence Intervals.

Pham-Thu, H., **Chao, S.–K.** and Härdle, W. (2014). Credit Risk Calibration based on CDS Spreads *SFB 649 Discussion Paper 2014-026*. [pdf]

Papers in preparation

Chao, S.–K. and Jirak, M. Minimax Tests for time evolving factor models.

Chao, S.–K. Online sparse principal component analysis.

Chao, S.–K., Cheng, G. and Yang, Y. Scalable Bayesian inference under high dimensionality.

Internal Grant

Start-up grant. $10,000. Aug. 15, 2018–Aug. 15, 2022
PI: Research Council (100%). $12,500. Jun. 1, 2019–Jun. 1, 2020

Students

Xiaoyu Ma (PhD)

Graduated Students

Dejun Kong (MA 2021, data science analyst at MBS textbook exchange)

Professional Service

Reviewing and editorial services
Associate Editor of *Computational Statistics and Data Analysis*, since Sep. 2018
Reviewer for *Mathematical Reviews*, since Jan. 2018

Funding panelist
MPS-DMS panel, National Science Foundation. 2021.

Economic Implications and Applications of Big Data in Food and Agriculture AFRI-NIFA Program, USDA. Oct. 2018.

Refereeing Works. Records are validated by Publon.
NeurIPS, ICLR, Annals of Statistics, JRSS-B, JASA, Journal of Machine Learning Research, Journal of Computational and Graphical Statistics, Bernoulli, Electronic Journal of Statistics, Statistica Sinica, Journal of Multivariate Analysis, Canadian Journal of Statistics, Journal of Statistical Planning and Inference, Computational Statistics and Data Analysis, Applied Stochastic Models in Business and Industry.

Professional Offices
ASA Mid-Missouri Chapter President, January 2021 – Present
ASA Mid-Missouri Chapter Vice President, January 2019 – December 2020

Master Committee (STAT)
Past: Xuefeng Hou (2020)

PhD Committee (STAT)
Current: Ruiwen Zhou, Dian Yang, Yuanyuan Guo, Josh North, Jiayi Hou
Past: Qiwei Wu (2019), Dongyan Yan (2019), Dayu Sun (2020)

PhD Committee (External)
Current: Xin Liu (Economics), Nitish Uplavikar (EECS), Ali Allami (EECS), Yuxuan Chen (Geological Science)

Departmental Committees
Colloquium (2019–2020), Graduate Admission Committee (2020–2021), Medical Biostatistics Certificate (2020–), Computational Statistics and Data Science Certificate (2020–)

Teaching Experience

University of Missouri–Columbia
STAT 4710/7710 Introduction to Mathematical Statistics (Spring 2021)
STAT 9310 Theory of Linear Models (Fall 2020)
STAT 9720 Mathematical Statistics II (Spring 2020)
STAT 4750/7750 Introduction To Probability Theory (Fall 2018, Spring 2019, Fall 2019)

Purdue University
STAT 350 Introduction To Statistics (Fall 2015, Fall 2017, Spring 2018) [`course outline`]

Humboldt University of Berlin
Multivariate Analysis II (Spring 2013 and 2015)
Statistical programming languages (Spring 2014)
Statistical Tools in Finance and Insurance (Fall 2013)
Statistics I and II recitation (Fall 2012 & Spring 2013)

Conference & Symposium Presentations

Sparsifying Deep Neural Networks with Generalized Regularized Dual Averaging
- *SLDS: Conference on Statistical Learning and Data Science/Nonparametric Statistics 2020*, CA, May. 27–29, 2020. (Postponed)
- *SIAM Conference on Mathematics of Data Science*, OH, May. 5–7, 2020. (Postponed)
- *Opening workshop on deep learning*, SAMSI, NC, Aug. 12–16, 2019.
- *2019 joint statistical meetings*, Denver, Jul. 28–30, 2019.

Distributed inference for quantile regression processes.
- *2019 ICSA applied statistics symposium*, NCSU, Jun. 9–12, 2019.

Diffusion Approximation to Stochastic Mirror Descent with Statistical Applications
- *9th International Purdue Symposium on Statistics*, Purdue University, Jun. 6–8, 2018.

Distributed inference for quantile regression processes (poster).
- *IMS New Researcher Conference*, Jul. 27–29, 2017.
- *Workshop on the Interface of Statistics and Optimization*, SAMSI, Feb. 8–10, 2017.

Quantile Process for Non and Semiparametric Regression.
4th IMS Asia Pacific Rim Meeting, Hong Kong, Jun. 27–Jun. 30, 2016.

Nuclear norm regularized large multiple quantile regression.
Humboldt-Aarhus-Xiamen (HAX) Workshop 2014, Berlin. October 6–8, 2014.

Confidence corridors for nonparametric multivariate generalized quantile regression.
- *3rd IMS Asia Pacific Rim Meeting*, Taipei, Jun. 29–Jul. 2, 2014.
- *SFB 823/649 Workshop "Methods and Challenges in Financial Risk Measurement"*, Druebeck(Germany), May 18–20, 2014.
- *Applicable Semiparametrics 2013*, Berlin, Oct. 11–12, 2013.

Quantile Regression in Risk Calibration.
- *3rd XMU-Humboldt workshop*, Xiamen University, Xiamen(China). May 2012.
- *CRC 649 Conference*, Motzen(Germany). February 2012.

Invited Talks

Colloquium, Department of Statistics and Probability, *Michigan State University*, MI, Apr. 2021.
Colloquium, Department of Mathematics, *Missouri S&T*, MO, Feb. 2021.
Statistics Seminar, Department of Mathematics, *Clemson University*, SC, Sep. 2020.
Seminar Discussant (virtual), National Association of Young Statisticians, China, Sep. 2020.
Statistics Seminar, Department of Mathematics, *WUSTL*, MO, Sep. 2018.
Seminar, Institute of Statistical Science, *Academia Sinica*, Taipei, Taiwan, Jul. 2018 and Feb. 2015.
Statistics Seminar, Department of Mathematical Sciences, *IUPUI*, IN, Oct. 2017.
Colloquium, Dept. of Mathematical Sciences, *University of Wisconsin-Milwaukee*, WI, Nov. 2016.
Statistics Seminar, Dept. of Statistics, *University of Illinois at Urbana-Champaign*, IL, Nov. 2015.
Statistics Seminar, Dept. of Mathematical Science, *Binghampton University*, NY, Oct. 2015.
Mathematical Statistics Seminar, Department of Statistics, *Purdue University*, IN, Sep. 2015.
Colloquium, Institute of Statistics, *National Tsing Hua University (NTHU)*, Taiwan, Feb. 2015.
Seminar, Department of Statistics and Biostatistics, *Rutgers University*, NJ, Nov. 2014.
Joint Seminar, Institute of Statistics, NTHU and NCTU, Taiwan, Mar. 2014.
Seminar, Dept. of Applied Math., *National Sun Yat-Sen University (NSYSU)*, Taiwan, Mar. 2014.
Research seminar, chair: Prof. Enno Mammen, *Universität Mannheim*, Germany, Feb. 2014.

Research Visits

Department of Statistics, *University of Wisconsin-Madison*, WI, Mar. 2015–Apr. 2015
Department of Mathematics, *Ruhr University Bochum*, Germany, Aug. 2013.

Seminar & Event Organized

ICSA Applied Statistics Symposium, Sep 12–15 2021, Online. (Scheduled)
Haindorf Seminar, Feb 7–10 2014, Hejnice, Czech Republic.
Haindorf Seminar, Feb 6–9 2013, Hejnice, Czech Republic.
International Research Training Group (IRTG) Evaluation, Sep. 2012, Berlin, Germany.
Humboldt-Princeton Conference, Oct. 28–29 2011, Berlin, Germany.

Professional Experience

University of Missouri System Teaching Scholars (UMTS) — Aug. 2020 – May 2021
Start Here 101: Online Course Design Basics Workshop (completed) — Jun. 2020
Start Here 102: Best Practices in Online Instruction (completed) — Aug. 2020

Yuanta Securities, Taipei, Taiwan Jul. 2010 – Aug. 2010

Skills

Statistical Packages: R, Mathematica, Matlab.
Applications: LaTeX, Bloomberg, Datastream database, MS Office.
Language: Chinese Mandarin (native), English (fluent), Taiwanese (some), German (some).