Muxuan Liang

2004 Mowry Rd. 5th Floor
Gainesville, FL 32603

Tel: (352)-294-5935
Email: *muxuan.liang@ufl.edu*

Research Interest

- I am broadly interested in the statistical methodology and machine learning techniques dealing with challenges in medical decision makings;

- **Method and Application**: treatment recommendation based on patient-level information, identifying signals and biomarkers from high-dimensional data, machine learning methods for medical decision makings;

- **Theory**: semi-parametric inference, high-dimensional inference, causal inference, and machine learning;

- **Collaboration and Scientific Research**: cancer therapeutic and preventive intervention, mHealth and its impact, interventions for diabetic patients.

Education

Ph.D. in Statistics   Sept, 2014 - Oct, 2018
University of Wisconsin-Madison, Madison, WI.

B.S. in Mathematics and Applied Mathematics   Sept, 2010 - May, 2014
Tsinghua University, Beijing, China

Experience

Assistant Professor   May, 2022 - Current
Department of Biostatistics
University of Florida, Gainesville, FL.

Post-Doctoral Research Fellow   Sep, 2019 - Mar, 2022
Fred Hutchinson Cancer Research Center, Seattle, WA.

Data Scientist   Dec, 2018 - Aug, 2019
Ads Metrics Team, Google, Mountain View, CA.

Summer Intern   Jun, 2017 - Aug, 2017
Eli Lilly & Company, Indianapolis, IN.

Selected Honors and Awards

Dean's Citation Award	2023
ASA Biometrics Section Travel Award ($1500)	2018
Poster Award on NIC-ASA & ICSA Midwest Joint Meeting ($500)	2018
Summer Optimization Program at SAMSI	2016

Papers

Personal websites: *https://muxuan.me/about-me*

Journals

1. **Liang, M.**, and Yu, M. (2023). Relative contrast estimation and inference for treatment recommendation. *Biometrics, In Print.*

2. Yang, D., Wheeler, M., Karanth, S.D., Aduse-Poku, L., Leeuwenburgh, C., Anton, S., Guo, Y., Bian, J., **Liang, M.**, Yoon, H.S. and Akinyemiju, T. (2023). Allostatic load and risk of all-cause, cancer-specific, and cardiovascular mortality in older cancer survivors: An analysis of the National Health and Nutrition Examination Survey 1999–2010. *Aging and Cancer, In Print.*

3. Mafee, M., Buhalog, B., **Liang, M.**, Yu, M., Aylward, J., and Xu, Y. (2023). Length-to-width ratio in Mohs defects: what is the golden rule? *Archives of Dermatological Research, In Print.*

4. Zhang, D., Spiropoulos, K. A., Wijayabahu, A., Christou, D. D., Karanth, S. D., Anton, S. D., **Liang, M.**, ... and Braithwaite, D. (2023). Low muscle mass is associated with a higher risk of all–cause and cardiovascular disease–specific mortality in cancer survivors. *Nutrition, 107, 111934.*

5. **Liang, M.**, Choi, Y.G., Ning, Y, Smith, M., and Zhao, Y.Q. (2022). Estimation and inference on high-dimensional individualized treatment rule in observational data using split-and-pooled de-correlated score. *Journal of Machine Learning Research, 23(262), 1-65.*

6. **Liang, M.**, and Yu, M. (2022). A semiparametric approach to model effect modification. *Journal of the American Statistical Association, 117(538), 752-764.*

7. Wang, Z., Receveur, J. P., Pu, J., Cong, H., Richards, C., **Liang, M.**., and Chung, H. (2022). Desiccation resistance differences in Drosophila species can be largely explained by variations in cuticular hydrocarbons. *Elife 11, e80859.*

8. Vardar, B., Meram, E., Karaoglu, K., **Liang, M.**, Yu, M., Laeseke, P., and Ozkan, O. (2022). Radioembolization followed by Transarterial Chemoembolozation in Hepatocellular Carcinoma. *Cureus, 14 (4).*

9. Li, Y., **Liang, M.**, Mao, L., and Wang, S. (2021). Robust estimation and variable selection for the accelerated failure time model. *Statistics in Medicine, 40(20), 4473-4491.*

10. **Liang, M.**, and Zhao, Y.Q. (2021). Comment on "More efficient policy learning via optimal retargeting" and "Learning optimal distributionally robust individualized treatment rules". *Journal of the American Statistical Association, 116 (534), 690-693.*

11. Park, J., **Liang, M.**, Alpert, J. M., Brown, R. F., and Zhong, X. (2021). The causal relationship between portal usage and self-efficacious health information–seeking behaviors: secondary analysis of the health information national trends survey data. *Journal of Medical Internet Research, 23(1), e17782.*

12. Zhong, X., Park, J., **Liang, M.**, Shi, F., Budd, P. R., Sprague, J. L., and Dewar, M. A. (2020). Characteristics of patients using different patient portal functions and the impact on primary care service utilization and appointment adherence: retrospective observational study. *Journal of Medical Internet Research, 22(2), e14410.*

13. **Liang, M.**, Ye, T., Fu H. (2018). Estimating individualized optimal combination therapies through outcome weighted deep learning algorithms. *Statistics in Medicine, 37(27), 3869-3886.*

14. Huling, J. D., Yu, M., **Liang, M.**, Smith, M. (2018). Risk prediction for heterogeneous populations with application to hospital admission prediction. *Biometrics, 74(2), 557-565.*

15. Zhong, X., **Liang, M.**, Sanchez, R., Yu, M., Budd, P. R., Sprague, J. L., and Dewar, M. A. (2018). On the effect of electronic patient portal on primary care utilization and appointment adherence. *BMC Medical Informatics and Decision Making, 18(1), 1-12.*

16. Coriano, C.G., Liu, F., Sievers, C.K., **Liang, M.**, Wang, Y., Lim, Y., Yu, M. and Xu, W. (2018). A computational-based approach to identify estrogen receptor α/β heterodimer selective ligands. *Molecular Pharmacology, 93(3), 197-207.*

17. Zhang, S., **Liang, M.**, Zhou, Z., Zhang, C., Chen, N., Chen, T., and Zeng, J. (2017). Elastic restricted boltzmann machines for cancer data analysis. *Quantitative Biology, 5(2), 159-172.*

18. **Liang, M.**, Li, Z., Chen, T., and Zeng, J. (2014). Integrative data analysis of multi-platform cancer data with a multimodal deep learning approach. *IEEE/ACM Transactions on Computational Biology and Bioinformatics, 12(4), 928-937.*

Manuscript:

Liang, M., Ning, Y, Smith, M., and Zhao, Y.Q. Inference with non-differentiable surrogate loss in a general high-dimensional classification framework. *Submitted.*

Park, J., **Liang, M.**, Zhao, Y. Q., and Zhong, X. Efficient surrogate-assisted inference for patient-reported outcome measures with complex missing mechanism. *Under revision at Electronic Journal of Statistics.*

Liang, M., Zhong, X., and Park, J. Robust and flexible learning of a high-dimensional classification rule using auxiliary outcomes. *Under revision at Biometrics.*

Liang, M., Mao, L., and Chen, G. Learning optimal individualized treatment rule under generalized value function. *Submitted.*

Liang, M., Zhao, Y.Q., and Zheng, Y. Estimating optimal tailored active surveillance strategy under interval censoring. *In preparation.*

Liang, M., Ye, T., and Zhao, Y.Q.. Estimating optimal individualized treatment rules with a reject option under partial identification. *In preparation.*

Book Chapter:

Liang, M., and Zhao, Y.Q.. Estimation and inference of individualized treatment rules using efficient augmentation and relaxation learning. *Precision Medicines: Methods and Applications, Springer, In print.*

TALKS

"Statistical inference of decision rules under a non-differentiable surrogate loss in a general classification framework."

- Invited Talk, ICSA China, Chengdu, 07/2023.

- ENAR Spring Meeting 2022 (online), 03/2022.

- Invited Talk, IISE, University of Florida, 11/2021.

"Efficient surrogate-assisted inference for patient-reported outcome with complex missing mechanisms."

- Invited Talk, Joint Statistical Meetings 2022, Washington D.C., 08/2022.

"Can a joint model improve targeted label prediction?"

- INFORMS Annual Meeting, Anaheim, CA., 10/2021.

"Indirect and direct learning of optimal individualized treatment rule."

- Department of Biostatistics, University of Florida, 09/2021.

- College of Health Solutions, Arizona State University, 05/2021.

- Department of Statistics, Purdue University, 03/2021.

- Biostatistics Department, MD Anderson Cancer Center, 02/2021.

"Relative contrast functions for individualized treatment recommendation."

- Joint Statistical Meetings 2021 (online), 08/2021.

- ENAR Spring Meeting 2021 (online), 03/2021.

"Learning a high-dimensional classification rule using auxiliary outcomes: A transfer learning approach."

- INFORMS Annual Meeting 2020 (online), 11/2020.

- Seminar Series, Fred Hutchinson Cancer Research Center, 08/2020.

"Estimation and inference on high-dimensional individualized treatment rule in observational data using split-and-pooled de-correlated score."

- Seminar Series, Fred Hutchinson Cancer Research Center, 05/2020.

- ENAR Spring Meeting 2020 (online), 03/2020.

- NeurIPS 2019, Vancouver Convention Center, Vancouver, CA., 12/2019.

"On the effect of electronic patient portal on primary care utilization."

- INFORMS Annual Meeting 2019, Seattle, USA, 10/2019.

"Ranking patients based on relative treatment effect with fairness."

- Winner poster on NIC-ASA & ICSA Midwest Joint Meeting, 10/2018.

"A semiparametric approach to model effect modification."

- Awardee talk, Joint Statistical Meetings, Vancouver, Canada, 08/2018.

- Invited talk, SGSA, Madison, WI., 03/2018.

Teaching and Mentoring

Instructor   Jan, 2023 - May, 2023
Course Title: PHC 6097 Statistical Learning
Department of Biostatistics
University of Florida, Gainesville, FL.

Co-mentored Students:

Jaeyoung Park, Ph.D.   Dec, 2019 - Aug, 2022
ISE, University of Florida, Gainesville, FL.
- Postdoctoral Research Fellow in Booth Business School at the University of Chicago.

Software

MySurg: Online treatment recommendation tool for Medicare diabetic patients.

- Shiny App;

- Take patient-level information as input and output recommendation between diet & exercise plan vs hypoglycemic agents with recommendation confidence.

ITRInference: Estimation and inference of a high-dimensional individualized treatment rule.

- R-based package;

- Incorporate bespoke choices to fit nuisance parameters.

RobustAFT: A unified Expectation-Maximization (EM) approach with the L1-norm penalty for the accelerated failure time model.

- R-based package;

- Consider multiple robust loss function for variable selection with right-censored data.

iMAVE: Dimension reduction for individualized treatment effect.
- R-based package with C++ backend using Eigen library for linear algebra;

VennLasso: Variable selection for heterogeneous populations (with Dr. Jared Huling).
- R-based package with C++ backend using Eigen library for linear algebra;
- Implement alternating direction method of multipliers (ADMM) algorithm.

Multideep: Integrative data analysis of multi-platform cancer data using deep Boltzmann machine.
- Matlab code;
- Implement stochastic gradient descent with bespoke structure of deep neural networks;
- Paper and code are cited over 150 times by the end of year 2020.

Technical Skills

Programming Languages: R, Python, C++ , GoLang (MapReduce).

Software: MATLAB, SQL, SAS.

Professional Memberships

American Statistical Association	Dec, 2017 - Present
International Chinese Statistical Association	Dec, 2017 - Present
Eastern North American Region, International Biometric Society	Dec, 2017 - Present

Service

- Journal reviewer:
  - Statistics in Medicine (1)
  - Biometrics (3)
  - Journal of Nonparametric Statistics (1)
  - IEEE Robotics and Automation Letters (4)
  - Journal of Machine Learning Research (2)
  - Journal of the American Statistical Association (4)
  - Journal of the Royal Statistical Society: Series B (1)
  - Annals of Statistics (1)
- Conference:
  - Session Chair, ICSA China 2023.
  - Session Chair, CFE-CMS 2022.

- Session Chair, ENAR 2021.

- Committee:

  - V Foundation for Cancer Research Grant Review Panel, 2023.

  - ICSA Best Poster Award Committee, 2022.

  - ICSA Student Paper Award Committee, 2022.

  - ICSA Student Paper Award Committee, 2021.

  - Committee Member of Statistics Graduate Student Association at UW-Madison, 2018.