

# LINQUAN MA

+1 608 736 0567  $\diamond$  mlqmlq1997@gmail.com

1300 University Avenue, Madison, WI, 53706, U.S.

Personal website: <https://mlqmlq.github.io>

## EDUCATION

---

**Department of Statistics, University of Wisconsin-Madison**

Aug. 2017 - May 2019

M.S. in Data Science.

GPA: **4.0/4.0**; Rank: **1/42** (out of all students in my program).

Core Courses: Statistical Inference I, II, Linear Models, Design and Analysis of Experiments, Time Series Analysis, Non-parametric Statistics, Classification and Regression Trees, Mathematical Statistics I (Ph.D. level), Data Science Computing Project.

**School of Gifted Young, University of Science and Technology of China** Aug. 2014 - May 2018

B.S. in Statistics.

Major GPA: **3.9/4.3**; Rank: Top **5/51** (out of all students studying statistics at School of Gifted Young).

Core Courses: Regression Analysis, Applied Statistical Software, Probability Theory, Mathematical Statistics, Stochastic Processes, Real Analysis, Complex Analysis, Functional Analysis, Mathematical Analysis I, II, III, Linear Algebra I, II.

## RESEARCH INTERESTS

---

Sufficient dimension reduction, multivariate regression, causal inference and missing data analysis.

## PUBLICATIONS

---

- **Ma, L.**, Yin, Y., Liu, L., Geng, Z. (2017). On the individual surrogate paradox. *Invited to submit revision, Biostatistics*. Preprint version: <http://arxiv.org/abs/1712.08732>
- **Ma, L.**, Liu, L., Yang, W. (2018). Envelope method with ignorable missing data. *Submitted to JASA*. Slides: <https://mlqmlq.github.io/envelope.pdf>
- Shi, Y., **Ma, L.**, Liu, L.. Sufficient Dimension Reduction in Mixed Effect Models. *To be submitted*.

## RESEARCH EXPERIENCE

---

**On the Individual Surrogate Paradox**

Apr. 2017 - Dec. 2017

*Adviser: Lan Liu, School of Statistics, University of Minnesota*

- Proposed a new method to evaluate the surrogate paradox based on an individual perspective.
- Proved the individual surrogate paradox can be excluded under certain criteria.
- Derived the sharp bounds of heterogeneity effect by applying simplex algorithm on the dual problem.
- Performed real data analysis on a clinical trial data, and built an R package called *HRsurrogate*.

**Envelope Method with Ignorable Missing Data**

Oct. 2017 - Nov. 2018

*Adviser: Lan Liu, School of Statistics, University of Minnesota*

- Developed a method for envelope estimation with both the predictors and the responses missing at random.
- Derived the parameter updates in the EM algorithm using advanced linear algebra techniques.
- Proved the superiority of the EM envelope over the standard EM in the sense of asymptotic variance.
- Confirmed the efficiency gain of our method in the simulations.
- Applied our method to the Chronic Renal Insufficiency Cohort (CRIC) study. Discovered two new significant biomarkers and got shorter confidence intervals using bootstrap.

## Sufficient Dimension Reduction in Mixed Effect Models

Aug. 2018 - Jan. 2019

*Adviser: Lan Liu, School of Statistics, University of Minnesota*

- Implemented the algorithm to reach the global minimum by choose a smart starting value.
- Realized the algorithm in R code and confirmed the superiority of our method in simulation.
- Performed data analysis on a longitudinal clinical dataset, and found additional significant parameters.

## Max Independent Component Analysis (In-progress)

May 2018 - Present

*Adviser: Zhengjun Zhang, Department of Statistics, University of Wisconsin-Madison*

- Recovering independent components in the existence of max operator in the linear system.
- Applied fast Fourier transformation to analyze signals in the frequency domain.
- Proposed a method of recovering the mixing matrix  $\mathbf{A}_{p \times p}$  by the joint distribution when  $p = 2$ .
- Working on generalizing the method when  $p \geq 3$ .

## COURSE PROJECTS

---

### Machine Learning with Large Scale Data Set Containing Missing Value Oct. 2017 - Dec. 2017

*Adviser: Wei-Yin Loh, Department of Statistics, University of Wisconsin-Madison*

- Handled high-dimensional National Birth Rate data set (several GB) through the server to predict whether a new born infant is underweight.
- Imputed missing values using MICE and GUIDE.
- Assessed various machine learning algorithms: logistic regression, regression trees, random forest, SVM, LDA, GUIDE, XgBoost and ensemble learning.
- Selected the best model by cross validation, and showed that ensemble learning outperforms other methods.

### Statistical Inference on the Gene Expression

Dec. 2017

*Adviser: Zhengjun Zhang, Department of Statistics, University of Wisconsin-Madison*

- Applied cross validation for tuning the lasso penalty parameter.
- Utilized Generalized Measures of Correlation (GMC) method for model selection.
- Detected the global maxima of the non-convex objective function by grid search of the starting points.

## AWARDS

---

Student Academic Excellence Award, UW-Madison

2017, 2018

Outstanding Student Scholarship, USTC

2014, 2015, 2016, 2017

## SKILLS & LANGUAGE

---

**Programming:** R,  $\text{\LaTeX}$ , Matlab, Bash, Python, C++.

**TOEFL:** 28(R) + 30(L) + 24(S) + 27(W) = 109.

**GRE:** Verbal 152; Quantitative 166; Writing 3.0.

## MISCELLANEOUS

---

**Talk:** Presented envelope method in the group meeting.

**TA Experience:** Hold office hours for the graduate level course *Statistical Inference*.

Fall 2018

**Seminars:** Got familiar with high-dimensional statistics, randomized linear algebra, non-linear optimization, graphical models, network analysis and deep learning.