

LINQUAN MA

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EDUCATION

Department of Statistics, University of Wisconsin-Madison

Aug. 2017 - May 2019

M.S. in Data Science

GPA: 4.0/4.0

Core Courses: Statistical Inference I, II, Linear Models, Design and Analysis of Experiments, Time Series Analysis, Non-parametric Statistics, Classification and Regression Trees.

Ongoing Courses: Mathematical Statistics I (Ph.D. level), Data Science Computing Project, Independence Study.

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

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

PUBLICATIONS

- **Ma, L., Yin, Y., Liu, L., Geng, Z.** (2017). On the individual surrogate paradox. *Submitted to Biostatistics*. Preprint version: <http://arxiv.org/abs/1712.08732>
- **Ma, L., Liu, L., Yang, W.** (2018). Envelope methods with ignorable missing data. *To be submitted*. Slides: <https://mlqmlq.github.io/envelope.pdf>

RESEARCH EXPERIENCE

On the Individual Surrogate Paradox

Apr. 2017 - Dec. 2017

- **Adviser: Lan Liu, School of Statistics, University of Minnesota**
- Proposed a new methodology to evaluate the surrogate paradox based on an individual perspective.
- Investigated whether the individual surrogate paradox could manifest under the existing criteria.
- Derived the sharp bounds of heterogeneity effect from the treatment to the outcome by simplex algorithm.
- Performed real data analysis on a clinical trial data to check whether individual surrogate paradox exists.
- Built an R package for practitioners who are interested in our method.

Envelope Methods with Ignorable Missing Data

Oct. 2017 - Nov. 2018

- **Adviser: Lan Liu, School of Statistics, University of Minnesota**
- Developed a method for envelope estimation when the predictors and the responses are missing at random.
- Incorporated the envelope structure in the expectation-maximization (EM) algorithm.
- Proved that the asymptotic variance of our proposed EM envelope estimator is never larger than the standard EM estimator, and confirmed that in the simulations.
- Applied our method to the Chronic Renal Insufficiency Cohort (CRIC) study, and found two additional significant biomarkers than the standard EM. Also, by bootstrapping, our estimates have smaller standard errors.

Max Independent Component Analysis (Ongoing)

May 2018 - Present

- **Adviser: Zhengjun Zhang, Department of Statistics, University of Wisconsin-Madison**
- Aimed at recovering independent components when there exists max operator in the linear system.
- Applied fast Fourier transform algorithm to analysis the signals in frequency domain.
- Working on solving the mixing matrix through the joint distribution of the signals.

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

- **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 using more than 200 covariates.
- 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 October 2017 - November 2018
Course Project

- **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	Dec. 2017, Jul. 2018
Outstanding Student Scholarship, USTC	2014, 2015, 2016, 2017

SKILLS

Programming: R, \LaTeX , Matlab, Bash, Python, C.

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

Other: Linux (Ubuntu), Mac OS, Windows OS.

EXTRA-CIRRICULAR ACTIVITIES

- Presented an introduction of envelope models in Prof. Zhengjun Zhang's group meeting.
- Holding office hours this semester for the graduate course *Statistical Inference*.
- Attended TRIPODS Madison summer school and learned a broad range of fundamental techniques used in modern data science and its applications.
- Attend seminar in our department regularly to get familiar with more statistical topics.