ZHIWEI XU

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SHORT BIO

Zhiwei Xu is a senior student in statistics at the University of Science and Technology of China (**USTC**). As an undergraduate, Zhiwei Xu was very fortunate to be advised by three amazing supervisors Prof. Weiping Zhang, Prof. Junwei Lu and Prof. Tianxi Cai, working on precision matrix estimation and inference on mutual information matrix.
His current research interests lie broadly in the span of statistical inference, limiting theory, and optimization.

EDUCATION

University of Science and Technology of China (USTC) *Hefei, China*
Bachelor of Science(Expected in 2022), *Sep.2018 - Present*
GPA: **3.94/4.3**, **3.96/4.0(WES verified)**, ranking: **3/91** in Statistics.
Courses: Multivariate Analysis (95), Convex Optimization (98), Functional Analysis (98), Real Analysis (100), Probability Theory (92), Differential Equations (100), Linear Algebra B1, B2 (95, 92), Calculus I, II (96, 97)

RESEARCH EXPERIENCES

Estimation and testing on Point-wise mutual information(PMI) matrix *May.2021 - Present*
Advisor: Prof. Junwei Lu, Prof. Tianxi Cai Harvard University

- Designed a novel low-rank PMI estimator with consistency and proved its asymptotic normality using the central limit theorem on the Markov chain.
- Investigated the covariance structure of the error matrix, and gave the upper bound of its norm.
- Proposed an efficient algorithm to calculate p-value of all entries of PMI matrix under null hypothesis based on the asymptotic normality of the estimator.

Estimation of banded precision matrix based on modified BIC *Jul.2020 - Jan.2021*
Advisor: Prof. Weiping Zhang USTC

- Read relevant papers on Extended Bayesian Information Criterion(EBIC) and Estimation of banded matrix with high dimension.
- Investigated the structure of precision matrix, and use Cholesky decomposition to convert the problem of matrix estimation into linear autoregression.
- Designed a novel modified BIC with consistency using ℓ_0-norm regularization.

PROJECTS

A COVID-19 Prediction Model based on Vector Autoregression *May.2021 - Jun.2021*
Advisor: Prof. Yu Chen | Time Series Analysis seminar in USTC

- Utilized grouped network vector autoregression (GNAR) model to predict COVID-19 confirmed cases based on history information.
- Proposed a new method for designing the adjacency matrix in this model based on the visiting law of human mobility
- Used Expectation-Maximization (EM) Algorithm to do coefficient estimation and implemented it on the cases in the United States and it worked well.

A survey regarding lasso and glmnet package *Dec.2020 - Jan.2021*
Advisor: Prof. Xueqin Wang | Convex Optimization seminar in USTC

- Learnt the theoretical property of LASSO and other penalized linear regression methods.
- Implemented different optimization methods used to solve LASSO such as coordinate descent and least angle regression.

A report on dimension reduction and coefficient estimation *Nov.2020 - Dec.2020*
Advisor: Prof. Zemin Zheng | Linear Statistical Models seminar in USTC

- Read some classical papers in regression model (e.g. SCAD), high-dimensional regression model (e.g. SRRR), Gaussian graphical model and some up-to-date methods such as Knockoff.
- Implemented paper 'Factor estimation and selection'(Yuan et.al 2007) and had a 45 min presentation about dimension reduction in multi-regression.

SKILLS

Programming Languages: C, R, Python, LaTeX

FELLOWSHIP AND SCHOLARSHIP

Silver Prize for Outstanding Scholarship in USTC *Oct.2020*
Gold Prize for Outstanding Scholarship in USTC *Oct.2019*
Outstanding Volunteer Award in USTC *Feb.2019*
Bronze Prize for Outstanding Freshmen Scholarship in USTC *Oct.2018*