Kisung You

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RESEARCH INTERESTS

My research interests broadly lie on the theory, methodology and application of Bayesian statistics. I have worked on high-dimensional mean and covariance estimations, nonparametric Bayesian models, differential equation models and sequential Monte Carlo methods. My thesis deals with the posterior convergence rate for high-dimensional covariance/precision matrix based on a new decision theoretical prior selection framework.

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate January 2017 – Present
Department of Applied and Computational Mathematics and Statistics, The University of Notre Dame, USA

- **Mentor:** Professor Lizhen Lin

EDUCATION

Ph.D., Statistics February 2017
Department of Statistics, Seoul National University, Korea

- **Advisor:** Professor Jaeyong Lee
- **Thesis:** *Asymptotic Properties of Posteriors for Large Covariance Matrices*

Bachelor of Science, Statistics February 2010
Department of Statistics, Seoul National University, Korea

FELLOWSHIPS AND AWARDS

- Travel Support Award for attending ISBA 2018 World Meeting, Edinburgh, UK
- Fellowship for Next Generation Scholars: type B, Seoul National University, September 2013 - August 2016
- Fellowship for Next Generation Scholars: type A, Seoul National University, September 2012 - February 2013

PUBLICATIONS

($* \rightarrow$ Corresponding author)

[1] **Lee, K.**, Lee, J. and Dass, S. C. (2018). Inference for differential equation models using relaxation via dynamical systems. *Computational Statistics & Data Analysis*. **127**: 116-134. [pdf]

[2] **Lee, K.*** and Lee, J. (2018). Optimal Bayesian minimax rate for unconstrained large covariance matrices. *Bayesian Analysis*. Accepted. [pdf]

[3] Dass, S. C., Lee, J., **Lee, K.*** and Park, J. (2017). Laplace based approximate posterior inference for differential equation models. *Statistics and Computing*, **27**(3): 679-698. [pdf]

[4] Dass, S. C., Lee, J. and **Lee, K.** (2016). Bayesian inference using two-stage Laplace approximation for differential equation models. *AIP Conference Proceedings*, Eds. Aamir Hussain Bhat, et al. **1787**(1). [pdf]

[5] Lee, Y., **Lee, K.***, Lee, K., Lee, J. and Seo, J. (2015). Introduction to the Indian buffet process: theory and applications. (in Korean) *The Korean Journal of Applied Statistics*, **28**(2): 251-268.

[6] Lee, J., **Lee, K.*** and Lee, Y. (2014). History and future of Bayesian statistics. (in Korean) *The Korean Journal of Applied Statistics*, **27**(6): 855-863.

[7] Kim, N., Nam, G., Kim, Y., Lee, D., Park, S., **Lee, K.** and Lee, J. (2014). Identification and classification of fresh lubricants and used engine Oils by GC/MS and Bayesian model. (in Korean) *Analytical Science and Technology*, **27**(1): 41-59.

PAPERS UNDER REVIEW AND PREPRINTS

[i] **Lee, K.** and Lin, L. Bayesian test and selection for bandwidth of high-dimensional banded precision matrices. *Submitted*

[ii] **Lee, K.**, Lee, J. and Lin, L. Minimax posterior convergence rates and model selection consistency in high-dimensional DAG models based on sparse Cholesky factors. *Major revision submitted to The Annals of Statistics*

[iii] **Lee, K.**, Chae, M. and Lin, L. Bayesian high-dimensional semi-parameteric inference beyond sub-Gaussian errors. *Submitted*

[iv] **Lee, K.** and Lee, J. Estimating large precision matrices via Cholesky decomposition. *Submitted*

RESEARCH EXPERIENCE

High-dimensional covariance matrix estimation — July 2013 – January 2017
Seoul National University

- I developed a decision theoretical prior selection framework for the Bayesian minimax theory and verified that the inverse-Wishart prior achieves the minimax rate for unconstrained covariance matrix ([2]). I also attained the posterior convergence rate for bandable precision matrices via Cholesky decomposition ([iv]).

Differential equation models — April 2012 – January 2017
Seoul National University

- I developed a Laplace-based approximation method for obtaining the posterior distribution of parameters in differential equation models with Prof. Sarat C. Dass (at Universiti Teknologi PETRONAS) and Prof. Jaeyong Lee ([3] and [4]).
- I have studied the sequential Monte Carlo methods for the inference of dynamic models. I adopted dynamic models to approximate differential equation models for the fast on-line Bayesian inference ([1]).

Nonparametric Bayesian models — December 2014 – April 2015
Seoul National University

- I have studied various nonparametric Bayesian models including Dirichlet process, Indian buffet process, Poisson process and their variants. In [5], we reviewed several algorithms for the Indian buffet process and described its application to find features in the image data set.

PRESENTATIONS

- Contributed talk. Minimax posterior convergence rates and model selection consistency in high-dimensional DAG models based on sparse Cholesky factors. EAC-ISBA 2018. *Seoul, Korea*, 07/2018.

- Poster presentation. Maximum pairwise Bayes factors (mxPBF): hypothesis tests for large covariance matrices. ISBA 2018 World Meeting. *Edinburgh, UK*, 06/2018.
- Statistics seminar. Minimax posterior convergence rates and model selection consistency in high-dimensional DAG models based on sparse Cholesky factors. *The University of Notre Dame, USA*, 03/2017.
- Statistics seminar. Bayesian high-dimensional semi-parameteric inference beyond sub-Gaussian errors. *The University of Notre Dame, USA*, 09/2018.
- Contributed talk. Bayesian high-dimensional semi-parameteric inference beyond sub-Gaussian errors. The Joint Statistical Meetings 2017. *Baltimore, USA*, 08/2017.
- Contributed talk. Estimating high-dimensional precision matrices via Cholesky decomposition. The 10th ICSA International Conference. *Shanghai Jiao Tong University, China*, 12/2016.
- Contributed talk. Laplace based approximate posterior inference for differential equation models. The First Eastern Asia Meeting on Bayesian Statistics. *Shanghai Jiao Tong University, China*, 12/2016.
- Statistics seminar. Asymptotic properties of posteriors for large covariance matrices. *Seoul National University, Korea*, 11/2016.
- Contributed talk. Approximate posterior inference for differential equation models. KSS Fall Conference. *Hankuk University of Foreign Studies, Korea*, 11/2015.
- Contributed talk. Approximate posterior inference for differential equation models. KDMS Fall Conference. *Pusan Bexco, Korea*, 12/2014.

TEACHING AND ADVISING EXPERIENCE

Teaching Assistant — Spring 2010 – Spring 2016
Seoul National University, Korea

- Advanced Bayesian Statistics (Spring 2016)
- Bayesian Statistics and lab with R (Spring 2015)
- Mathematical Statistics 2 (Fall 2014)
- Statistical computing and lab with C and R (Fall 2013)
- Multivariate data analysis and lab with SAS (Fall 2012)
- Computational statistics and lab with C and R (Fall 2011, Fall 2015)
- Introduction to statistics (Spring 2010, Fall 2010)

Instructor — Fall 2012
Chung-Ang University, Korea

- Statistics

REFERENCES

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