BORA JIN

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✉ Department of Statistical Science, Duke University, Durham, NC 27708

RESEARCH INTERESTS

Environmental health, spatial statistics, multivariate data, hierarchical models, latent variables, Bayesian methods

EDUCATION

Ph.D. Candidate in Statistical Science   **2018 – 2022 (expected)**
Duke University   Durham, NC, USA
Advisors: Amy H. Herring, David Dunson

Master of Applied Statistics   **2015 – 2017**
Korea University, 4.25 Grade Point Average (4.5 Scale)   Seoul, SOUTH KOREA

Bachelor of Economics in Statistics   **2011 – 2015**
Korea University, 4.3 Grade Point Average (4.5 Scale)   Seoul, SOUTH KOREA

RESEARCH EXPERIENCE

Effects of Short-term Air Pollution on COVID-19   **Present**
with Dunson, D.

- Build a Bayesian model to predict effects of PM2.5 with and without wildfires.
- Include information about dynamics of wildfires and their progression into a Gaussian process (GP) using multiple directed acyclic graphs (DAG).
- Investigate the short-term effect of PM2.5 on respiratory diseases including COVID-19.

Prediction for Per- and polyfluoroalkyl Substances in relation to Stream Networks   **Present**
with Herring, A.H.

- Develop a predictive spatial model for per- and polyfluoroalkyl substances (PFAS) in public water system (PWS) along with uncertainty quantification.
- Identify upstream and downstream information of PWSs in relation to the nearest stream network and construct a corresponding DAG.
- Fit a multivariate GP using the DAG, incorporating external factors such as known sources or known relationship between PFAS compounds.

Bayesian Matrix Completion for Hypothesis Testing   **2019 – 2020**
with Dunson, D., Rager, J.E., Reif, D., Engel, S.M., Herring, A.H.

- Adapted Bayesian heteroscedastic nonparametric regression to a multiple hypothesis testing framework.
- Imposed a generalized latent factor model to form a non-exchangeable prior for testing.
- Developed a matrix completion method for a latent matrix.
- Tackled sparsity of the ToxCast data using hierarchical framework.
- Enabled prediction for non-tested chemical's activity.
- Broadened the definition of activity including heteroscedasticity.

Master's thesis on Bayesian Methods   **March 2015 – February 2017**
Korea University   **Seoul, SOUTH KOREA**

- Applied Bayesian inference for a seemingly unrelated regression model and examined novel statistical methods on an extended instrumental variables model with random effects using the MCMC method.
- Employed the extension to a nonparametric model using cosine basis functions and the Dirichlet process location-scale mixture for a great deal of flexibility on the proposed model.
- Conducted a real data application explaining Annex I Parties variations in compliance to the Kyoto Protocol.

Prediction of Carbon Emissions in Industrial Setting   **June 2016 – August 2016**
Korean Environment Ministry   **Seoul, SOUTH KOREA**

- Trained toward a generalist dealing with global environmental issues in both national and international settings through the 8th International Environmental Expert Training Program.
- Applied statistical prediction analysis in studying afforestation practices within industrial complex areas.
- Developed strategic programs to implement carbon reduction targets of industrial complexes.

Clustering of Cancer Patients' Symptoms   **March 2016 – August 2016**
College of Nursing at Chungnam National University   **Seoul, SOUTH KOREA**

- Conducted clustering analysis to see if symptoms are divided into particular clusters as expected in a theory.
- Measured the effect of symptom clusters on the quality of life through physical functions.
- Provided expertise on all aspects from the interpretation of statistical results to the presentation of statistics and graphics.

Emotionality of Language in Online Platforms   **October 2014 – March 2015**
MezzoMedia & SungKyunKwan University   **Seoul, SOUTH KOREA**

- Contributed to the development of a Korean morphological analyser.
- Embedded factor analysis and principal component analysis to determine appropriate weights of frequently used morphemes based on their verbal and social context.
- Designed and interpreted quantitative research examining the emotionality of language in online platforms.

WORK EXPERIENCE

ENVIRONMENTAL STATISTICS

Internship in Chemicals and Waste   **February 2017 – August 2017**
UN Environment   **Geneva, SWITZERLAND**

- Managed national reports that Parties are obliged to submit under Basel and Stockholm Conventions and analysed national reporting data so as to identify regional patterns and temporal trends.
- Designed a query system to facilitate proper visualizations and the use of collected data from national reports.
- Participated in the formulation of indicators with regards to Sustainable Development Goals.

BIG DATA & FINANCE

Internship in the Division of Budget and Finance   **January 2018 – July 2018**
International Atomic Energy Agency   **Vienna, AUSTRIA**

- Managed data compliance of requests for all types of procurement and payment in the Agency.
- Analysed collected data as a member of Master Data Management Team.
- Assisted a clean-up project of the Agency's bank and branch pages through Oracle sql and MS Access.
- Published monthly infographics on activities of the whole division.

Internship in Banking and Finance, Market Surveillance Department   **June 2014 – July 2014**
Korea Exchange (KRX)   **Seoul, SOUTH KOREA**

- Focused upon the detection of unfair transactions, particularly with regards to high turnover volume accounts.
- Conducted data management including updating, arranging and organising big data.
- Participated in developing case-specific restrictions and market-wide regulatory practices.

TEACHING EXPERIENCE

Head Teaching Assistant   **Present**
Duke University   **Durham, NC, USA**

- Theory and Methods of Statistical Learning and Inference (STA432)

Teaching Assistant   **January 2019 – May 2019**
Duke University   **Durham, NC, USA**

- Statistics (STA250)

Teaching Assistant   **September 2015 – December 2015**
Korea University   **Seoul, SOUTH KOREA**

- Introduction to Probability Theory (STAT201)
- Topics in Mathematical Statistics (STAT412)

Mentoring in Mathematics   **January 2013**
Samsung   **Seoul, SOUTH KOREA**

KEY SKILLS

- R, MATLAB, Python, SAS, MySQL, MS Office, LATEX
- English (Professional Proficiency), Korean (Native)

HONOURS

Global Korea Scholarship	2018 – 2020
First Prize in the Graduate Paper Section at the Korean Statistical Society's Annual Conference	2016
Yangcheon Foundation Scholarship for Academic Excellence	2016
So-Mang Presbyterian Church Scholarship for Academic Merit	2016

Second Prize in the Graduate Poster Section at the Korean Statistical Society's Annual Conference   2015
The Dean's Award for Academic Merit   2011 – 2014
Ministry of Gender Equality and Family Affairs Minister's Honour Award   2012
Seoul National University President's Prize   2011

PUBLICATIONS

Jin, B., Dunson, D., Rager, J.E., Reif, D., Engel, S.M., Herring, A.H. (2020+). Bayesian Matrix Completion for Hypothesis Testing. *submitted* [ArXiv]

WORKING PAPERS

Jin, B., Dunson, D. Effects of short-term air pollution on COVID-19.

Jin, B., Herring, A.H. Prediction for Per- and polyfluoroalkyl substances in relation to stream networks.