

JUNRUI DI

(Updated Mar 21st 2019)

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STATISTICAL METHODS RESEARCH INTERESTS

feature engineering from accelerometry signals, dimension reduction, functional data analysis, integration of multiple modalities, multilevel data.

SCIENTIFIC RESEARCH INTERESTS

wearable devices and their applications in public health (e.g. mental health and aging) and clinical trials (e.g. disease monitoring and assessment), physical activity assessment, sleep, circadian rhythmicity.

EDUCATION

Johns Hopkins Bloomberg School of Public Health *Mar 2019*
Ph.D. in Biostatistics

Thesis: *Feature Engineering and Statistical Modeling of Wearable Devices Data*

Advisor: Vadim Zipunnikov, Ph.D.

Georgetown University *Dec 2013*
M.S. in Biostatistics

Thesis: *Robust Integrative Analysis of Multi-Block Contaminated Datasets*

Advisor: Valeriy Korostyshevskiy, Ph.D.

University of California, Berkeley *May 2012*
B.A. in Applied Mathematics

High Distinction General Scholarship (roughly equivalent to Magna Cum Laude)

EXPERIENCE

Research Assistant *Jun 2015 - Apr 2019*
Johns Hopkins Bloomberg School of Public Health *Baltimore, MD*

- Developed statistical methods to extract features from noisy accelerometry signal, to reduce dimensionality of multivariate accelerometry features, and to integratively analyze features representing multiple physiological domains.
- Conducted data processing and statistical analysis of multiple studies with measurements of sleep, activity, and circadian rhythms using wearable devices.

Biostatistician Intern *Jun 2018 - Aug 2018*
Takeda Pharmaceuticals *Cambridge, MA*

- Provided theoretical and analytic evidence that digital endpoints measured by wearable devices are more sensitive than traditional measurement.
- Developed an R Shiny App to analyze/visualize a clinical study with a chest-worn device to measure physical activity and cardiovascular behavior to assist clinicians to identify false positive events reported.

Research Assistant *May 2013 - Apr 2014*
Georgetown University, Medicine *Washington, DC*

- Supported the Multicenter AIDS Cohort Study (MACS) site PI by providing data analysis, visualization, and tabulation on data generated from the 30-year nationwide longitudinal cohort study involving four sites, and over two hundred tested variables.
- Quantified satisficing in MACS online survey based on the group-based trajectory analysis of average response time across visits.

Research Assistant

Georgetown University, Biostatistics

Sep 2012 - May 2013

Washington, DC

- Refined Joint and Individual Variation Explained (i.e. JIVE), a recently developed integrative analysis method of multi-block datasets of different types, to be robust to outliers using low-rank approximation based on robust singular value decomposition.
- Selected metabolomics biomarkers to develop clinical assays for diagnosis and prognosis of Pancreatic Ductal Adenocarcinoma (PDAC) by applying various variable selection techniques.

PUBLICATIONS

Published / In Press

1. Schrack, J., Kuo, P., Wanigatunga, A., **Di, J.**, Simonsick, EM., Spira, A., Ferrucci, L., and Zipunnikov, V.. Active-to-Sedentary behavior transitions, fatigability, and physical functioning in older adults. *Journal of Gerontology: Series A*. 2019; 74(4): 560-567.
2. Johns, J., **Di, J.**, Merikangas, K., Cui, L., Swendsen, J., and Zipunnikov, V.. Fragmentation as a novel measure of stability in normalized trajectories of mood and attention measured by ecological momentary assessment. *Psychological Assessment*. 2019; 31(3): 329-339.
3. Leroux, A., **Di, J.**, Smirnova, E., McGuffey, E., Cao, Q., Bayatmokhtari, E., Tabacu, L., Zipunnikov, V., Urbanek, J., Crainiceanu, C.. Organizing and analyzing the activity data in NHANES. *Statistics in Biosciences*. 2019.
4. Schmidt, A., Bosse, M., Obremsky, W., O'Toole, R., Carroll, E., Stinner, D., Hak, D., Karunakar, M., Hayda, R., Frey, K., **Di, J.**, Zipunnikov, V., MacKenzie, E., and METRC. Continuous near-infrared spectroscopy demonstrates limitations in monitoring the development of acute compartment syndrome in patients with leg injuries. *The Journal of Bone & Joint Surgery*. 2018; 100(19): 1645-1652.
5. Grigsby, M., **Di, J.**, Leroux, A., Xiao, L., Zipunnikov, V., Crainiceanu, C., and Checkley, W.. Novel metrics for growth model selection. *Emerging Themes in Epidemiology*. 2018; 15(1): 4.
6. Urbanek, J., Spira, A., **Di, J.**, Leroux, A., Crainiceanu, C., and Zipunnikov, V.. Epidemiology of objectively measured bedtime and chronotype in US adolescents and adults: NHANES 2003-2006. *Chronobiology International*. 2018; 35(3): 416-434.
7. Varma, V., Dey D., Leroux A., **Di, J.**, Urbanek, J., Xiao, L., and Zipunnikov, V.. Total volume of physical activity: TAC, TLAC or TAC(λ). *Preventive Medicine*. 2018; 106: 233-235.
8. Varma, V., Dey D., Leroux A., **Di, J.**, Urbanek, J., Xiao, L., and Zipunnikov, V.. Re-evaluating the effect of age on physical activity over the lifespan. *Preventive Medicine*. 2017; 101: 102-108.
9. **Di, J.**, Li, Y., Friedman, MR., Reddy, S., Surkan, PJ., Shoptaw, S., and Plankey, M.. Determining survey satisficing of online longitudinal survey data in the Multicenter AIDS Cohort Study using a Group-Based Trajectory Analysis. *Journal of Medical Internet Research Public Health and Surveillance*. 2016; 2(2): e150.

Preprints / Technical Reports

10. **Di, J.**, Leroux, A., Urbanek, J., R., Varadhan, Spira, A., Schrack, J., and Zipunnikov, V.. Patterns of sedentary and active time accumulation are associated with mortality in US adults: The NHANES study. *bioRxiv: 182337*.

Under Review / Revision

11. **Di, J.**, Spira, A., Bai, J., Urbanek, J., Leroux, A., Wu, M., Resnick, S., Simonsick, E., Ferrucci, L., Schrack, J., and Zipunnikov, V.. Joint and individual representation of domains of physical activity, sleep, and circadian rhythmicity. Under review *Statistics in Biosciences*.
12. Schmidt, A., **Di, J.**, Zipunnikov, V., Frey, K., Scharfstein, D., O'Toole, R., Bosse, M., Obremskey, W., Stinner, D., Hayda, R., Karunakar, R., Hak, M., Carroll, E., Collins, S., MacKenzie, E.. Perfusion pressure lacks diagnostic specificity for the diagnosis of acute compartment syndrome. Under review *Journal of Orthopaedic Trauma*.
13. Malone, SK., **Di, J.**, Leroux A., Riegel B., Melkus, GD., Rickels, M., Pubjabi, N., Pach, A., Crainiceanu, C., and Urbanek, J.. Bedtime habits in adults with and without diabetes. Under review *Nursing Research*.
14. Chen O.Y., Cao, H., Phan H., Gou, J., Qian, T., Reinen, J., **Di, J.**, Cannon, T., and De Vos, M.. High-dimensional whole brain mediation analysis: methods and application in psychosis research. Under review *Journal of American Statistical Association ABCS*.

In Preparation

15. Capturing enhanced information with higher-order tensorian statistics and its application in accelerometry-measured physical activity. Ready to submit to *Biometrics*.
16. **Di, J.**, Leroux, A., Urbanek, J., Wanigatunga A., R., Varadhan, Spira, A., Schrack, J., and Zipunnikov, V.. Prolonging active and breaking sedentary bouts are independently associated with mortality in US adults: The NHANES study. Ready to submit to *American Journal of Preventive Medicine*.
17. Activity fragmentation is associated with mortality in BLSA. *In progress*.

SOFTWARES

1. **actigraphy** (R package). Feature extraction from minute level actigraphy/accelerometry data.
<https://github.com/junruidi/actigraphy>.
2. **cdHOTS** (R package). Construct and decompose higher order tensorian statistics.
<https://github.com/junruidi/cdHOTS>.
3. **actigraphy-profiles** (R Shiny app). A visualization tool for displaying minute-level actigraphy profiles.
<https://github.com/junruidi/actigraphy-profiles>

PRESENTATIONS

1. Integrative Analysis of Domains of Physical Activity, Sleep, and Circadian Rhythmicity Collected by Wearables. (**invited**). *2019 JSM, Denver, Colorado*.
2. Joint and Individual Representation of Domains of Physical Activity, Sleep, and Circadian Rhythmicity Collected by Wearables (**invited**). *2018 BigDIA, Houston, TX*.
3. Feature Engineering and Statistical Modeling of Wearable Devices data (**invited**). *Critical-Path Institute, 2018*.

4. Capturing Enhanced Information with Higher-Order Tensorian Statistics and Predicting Mortality from Accelerometry-MeasurePhysical Activity (contributed). *2018 JSM, Vancouver, BC, Canada.*
5. Analysis of Tensor Cumulants and Its Application to NHANES (contributed). *2018 ENAR, Atlanta, GA.*
6. Fragmentation of Daily Physical Activity: Prediction of Mortality in NHANES 2003-2006 (oral). *2017 IAGG, San Francisco, CA.*
7. Fragmentation of Physical Activity and Its Application (oral). *2017 ICAMPAM, Bethesda, MD.*
8. Novel Statistical Framework to Quantify Fragmentation of Physical Activity (contributed). *2017 ENAR, Washington, DC.*
9. Fragmentation of Physical Activity and Its Application (poster). *2016 Baltimore Aging Showcases, Baltimore, MD.*
10. Integrative Analysis of Multi-Block Contaminated Datasets (topic contributed). *2013 JSM, Montreal, Canada.*

EDITORIAL ACTIVITIES

Referee for:

Journal of Statistical Software (JSS) [1]

International Association of Gerontology and Geriatrics 2017 World Congress (IAGG) [1]

Journal of Medical Internet Research Cardio (JMIR Cardio) [1]

Journal of Medical Internet Research Mental Health (JMIR Mental Health) [1]

Journal of Medical Internet Research mHealth and uHealth (JMIR mHealth and uHealth) [2]

Interactive Journal of Medical Research [1]

Statistics in Biosciences (SIB) [1]

Journal of Medical Internet Research Research Protocols (JRP) [1]

Journal of Medical Internet Research Serious Games (JSG) [1]

PROFESSIONAL ACTIVITIES

Session chair, JSM 2018

Organizer of the JHSPH Biostatistics Computing Club 2015 - 2016

HONORS & AWARDS

BigDIA Travel Award *Sep 2018*

This is the travel award for the 4th International Conference on Big Data and Information Analytics.

The June B. Culley Award *Dec 2017*

This award honors outstanding achievement by a Biostatistics student on his or her schoolwide examination paper.

The Louis I. and Thomas D. Dublin Award *Mar 2017*

This award, which is for the Advancement of Epidemiology and Biostatistics, supports those students whose research focuses on the effective use of statistical reasoning and methods in epidemiology.

Washington Statistical Society Outstanding Graduate Student Award

Jun 2013

This award is presented by the Washington Statistical Society to the outstanding full-time graduate student of statistics/biostatistics at each university in the Washington metropolitan area with a graduate statistics/biostatistics program.

Phi Beta Kappa Honor Society Inductee

May 2012

Phi Beta Kappa Honor Society

TEACHING EXPERIENCE

PH.140.623 - **Lab Instructor** Statistical Methods in Public Health III

Spring 2019

PH.140.621 - **Lab Instructor** Statistical Methods in Public Health I

Fall 2018

PH.140.623 - **Lab Instructor** Statistical Methods in Public Health III

Spring 2018

PH.140.621 - **Lab Instructor** Statistical Methods in Public Health I

Fall 2017

PH.140.623-4 - **TA** Statistical Methods in Public Health III-IV

Spring 2017

PH.140.621-2 - **TA** Statistical Methods in Public Health I-II

Fall 2016

PH.140.753-4 - **TA** Advanced Methods in Biostatistics III-IV

Spring 2016

PH.140.751-2 - **TA** Advanced Methods in Biostatistics I-II

Fall 2015

BIST 514 - **TA** Linear Modeling & Multivariate Analysis

Spring 2014

PROFESSIONAL MEMBERSHIP

American Statistical Association (ASA)

Washington Statistical Society (WSS)

International Biometric Society (ENAR)

CERTIFICATIONS

SAS Certified Advanced Programmer for SAS 9

Aug 2013

SAS Certified Base Programmer for SAS 9

Jul 2013