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Marta Karas

CONTACT INFORMATION

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EDUCATION

Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

Ph.D., Biostatistics, Aug 2017 – (Exp.) Dec 2021

- Academic Advisors: Ciprian M. Crainiceanu, Jacek K. Urbanek

Wroclaw University of Science and Technology, Wroclaw, Poland

M.S., Mathematics (Mathematical Statistics), Jul 2015

- Dissertation: "Theoretical and practical issues in change point detection." (*Thesis link*)
- Academic Advisor: Malgorzata Bogdan
- Final grade: 5.5 (Excellent). Graduation with Academic Distinction

Wroclaw University of Science and Technology, Wroclaw, Poland

B.S., Mathematics, Jun 2013

- Final grade: 5.0 (Very good)

ACADEMIC EXPERIENCE

Johns Hopkins University, Department of Biostatistics, Bloomberg School of Public Health, Baltimore, MD, USA

Research Assistant **Jan 2018 - present**

- Developed and published open-source methods for pattern segmentation from high-frequency accelerometry data.
- Developed method for high-specificity identification of walking from wrist-worn accelerometry data collected in free-living.
- Designed and conducted small studies to collect high-frequency accelerometry data in free-living/with semi-supervised exercise bouts. Made some of collected data open-source.
- Developed open-source software (R packages) scoring total of 2500+ CRAN downloads/month.
- Work in progress: provide rigorous and methodologically-novel ways to derive mapping for measures of physical activity.
- Work in progress: research resampling method for estimating sample size in complex modeling settings.

Indiana University Bloomington, Department of Epidemiology and Biostatistics, School of Public Health, Bloomington, IN, USA

Research Assistant **Jan 2017 - Jul 2017**

- Applied graph-constrained regularization methods to determine what brain structural imaging markers are associated with HIV+/HIV− status.

Indiana University – Purdue University Indianapolis, Department of Biostatistics, Richard M. Fairbanks School of Public Health, Indianapolis, IN, USA

Research Assistant **Jan 2016 - Jul 2016**

- Developed extension of existing graph-constrained regularization methods for linear regression. Investigated what brain structural imaging markers are associated with alcohol abuse.

Teaching Experience

Johns Hopkins University, Department of Biostatistics, Bloomberg School of Public Health, Baltimore, MD, USA

Teaching assistant

- 2020-21 Term 2 - 140.651 Methods in Biostatistics II. *Lead TA*
- 2020-21 Term 1 - 140.651 Methods in Biostatistics I. *Lead TA*
- 2019-20 Term 2 - 140.652 Methods in Biostatistics II. *Lead TA*
- 2019-20 Term 1 - 140.651 Methods in Biostatistics I. *Lead TA*
- 2018-19 Term 4 - 140.624 Statistical Methods in Public Health IV. *TA*
- 2018-19 Term 3 - 140.623 Statistical Methods in Public Health III. *TA*
- 2018-19 Term 2 - 140.652 Methods in Biostatistics II. *TA*
- 2018-19 Term 1 - 140.651 Methods in Biostatistics I. *TA*

Instructor

- 2019-20 Term 1 - 140.850 - Special topics course: Biostatistical Methods for Wearable Computing. *Co-instructor*

Honors and Awards

1. Louis I. and Thomas D. Dublin Award for the Advancement of Epidemiology and Biostatistics. Johns Hopkins University, Department of Biostatistics and Department of Epidemiology. 2021 (*link*)
2. Helen Abbey Award for excellence in teaching. Johns Hopkins University, Department of Biostatistics. 2021 (*link*)
3. Leadership, Empowerment and Learning Culture Award. Novartis US Analytics Conference. 2019
4. ENAR Poster Award. ENAR. 2017

Professional activities

- Referee for: PLOS ONE, Digital Biomarkers.
- JHU Biostatistics Student Organization service: International Students Affairs Committee chair.

Publications

1. **Karas, M.**, Urbanek, J.K., Illiano, V.P., Bogaarts, G., Crainiceanu, C.M., Dorn, J.F. (2021). *Estimation of free-living walking cadence from wrist-worn sensor accelerometry data and its association with SF-36 quality of life scores*, Submitted.
2. Brzyski, D., **Karas, M.**, Ances, B., Dzemidzic, M., Goni, J., Randolph, T.W., Harezlak, J. (2021). *Connectivity-Informed Adaptive Regularization for Generalized Outcomes*, The Canadian Journal of Statistics.
3. **Karas, M.**, Marinsek, N., Goldhahn, J., Foschini, L., Ramirez, E., Clay, I. (2020). *Predicting subjective recovery from lower limb surgery using consumer wearables*, Digital Biomarkers, 4(suppl 1):73-86. (*Article link*)
4. **Karas, M.**, Straczkiewicz, M., Fadel, W., Harezlak, J., Crainiceanu, C.M., Urbanek, J.K. (2018). *Adaptive empirical pattern transformation (ADEPT) with application to walking stride segmentation*, Biostatistics, kxz033. (*Article link*)
5. **Karas, M.**, Bai, J., Straczkiewicz, M., Harezlak, J., Glynn, N W., Harris, T., Zipunnikov, V., Crainiceanu, C.M., Urbanek, J.K. (2019). *Accelerometry data in health research: challenges and opportunities.* Statistics in Biosciences, 11(2), 210237. (*Article link*)
6. **Karas, M.**, Brzyski, D., Dzemidzic, M., Goni, J., Kareken, D.A., Randolph, T., Harezlak, J. (2019). *Brain connectivity-informed regularization methods for regression.* Statistics in Biosciences, 11(1), 47-90. (*Article link*)

Conference Posters

1. **Karas, M.**, Brzyski, D., Ances, B., Goni, J., Randolph, T.W., Harezlak, J. *Association of Structural Brain Imaging Measures with HIV Markers Incorporating Structural Connectivity Information: a Regularized Statistical Approach.* ENAR, Washington DC, USA, Mar 2017. (Received ENAR Poster Award).
2. **Karas, M.** *Penalized regression inference regarding variable selection in high dimensions: presentation of selected methods implemented in R.* European R Users Conference, Poznan, Poland, Oct 2016.

Conference/Invited Talks

1. **Karas, M.**, Dorn, J., Urbanek, J.K. *Estimation of free-living walking cadence from wrist-worn sensor accelerometry data and its association with SF-36 quality of life scores.* ENAR 2021, virtual conference, Mar 2021.
2. **Karas, M.**, Dorn, J., Urbanek, J.K. *Estimation of free-living walking cadence from wrist-worn sensor accelerometry data and its association with SF-36 quality of life scores.* CMStatistics 2020, virtual conference, Dec 2020.
3. **Karas, M.**, Dorn, J., Urbanek, J.K. *Novel approach for precise walking cadence estimation from high-density tri-axial accelerometry data collected at wrist in free-living.* 41st Annual Conference of the International Society for Clinical Biostatistics, virtual conference, Aug 2020.
4. **Karas, M.**, Roemmich, R., Bastian, A., Urbanek, J.K. Urbanek, Crainiceanu, C.M. *Functional registration of walking strides in high-density accelerometry data for estimation of gait asymmetry.* CFE-CMStatistics 2019 conference, London, UK, Dec 2019.
5. **Karas, M.**, Dorn, J. *Walking measurements derived from free-living wrist-worn sensor as novel digital endpoints.* Novartis 2019 US Analytics Conference, East Hanover, NJ, USA, Oct 2019.
6. **Karas, M.**, Roemmich, R., Crainiceanu, C.M., Bastian, A., Urbanek, J.K. *Automatic estimation of step asymmetry from accelerometry data.* ICAMPAM 2019, Maastricht, The Netherlands, Jul 2019.
7. **Karas, M.**, Harezlak, J., Straczkiewicz, M., Fadel, W., Crainiceanu, C.M., Urbanek, J.K. *ADaptive Empirical Pattern Transformation (ADEPT) with application to walking stride segmentation.* JSM 2018, Vancouver, Canada, Aug 2018.
8. **Karas, M.**. *Wearable accelerometers, accelerometry data and automatic steps segmentation in R: strideter and convo R packages.* Why R? 2018 Conference, Wroclaw, Poland, Jul 2018.

Software

1. `arctools R` package: Processing and Physical Activity Summaries of Minute Level Activity Data *GitHub*)
2. `adept R` package: Adaptive Empirical Pattern Transformation. (*CRAN*, *GitHub*, *website*). (Selected in Top 40 new CRAN packages in May 2019; *list link*)
3. `adeptdata R` package: Accelerometry Data Sets. (*CRAN*, *GitHub*)
4. `runstats R` package: Fast Computation of Running Statistics for Time Series. (*CRAN*, *GitHub*, *website*)
5. `mdpeer R` package: Graph-Constrained Regression with Enhanced Regularization Parameters Selection. (*CRAN*)

Industry Experience

Evidation Health (Health Tech), Santa Barbara, CA, USA

Data Science Intern **Jun 2019 - Aug 2019**

- Completed project aimed at estimating medical procedure recovery trajectories and predicting recovery time from wearable patient-generated health data (research article published).
- Proposed to expand existing methodology for measuring sedentary/active accumulation time to leverage activity data available in other data analysis project.

Novartis (Pharmaceutical), Basel, Switzerland

Sensor Data Analytic Intern **Jun 2019 - Aug 2019**

- Proposed and implemented method for free-living walking segmentation from wrist-worn accelerometry sensor (research article submitted).
- Identified associations derived between walking features and PROs in diseased population.

Opera Software (Software), Wroclaw, Poland

Analyst **Aug 2016 - Dec 2016**

- Developed time-series forecasting models for Opera browser's core metrics.
- Performed Bayesian analysis to describe and infer about browser's users performance.

Opera Software (Software), Wroclaw, Poland

Analyst **Jul 2015 - Dec 2015**

- Established methodology for A/B-test results analysis, including selection of statistical methods and implementation of a complete tool in `R`.
- Performed user base analysis for software product improvements.

Datarino (Big Data Services & Data Management Solutions), Wroclaw, Poland

Data Scientist **Jul 2014 - Mar 2015**

- Analyzed user activity and monetization KPIs of a Polish social networking service.
- Retrieved knowledge from business partners' big-data size data sets.

KRUK S.A. (Debt collection), Wroclaw, Poland

Intern **Jun 2014**

- Compared feature selection methods addressing serious correlation problem.
- Implemented and applied a text mining tool for utilizing unstructured text data in `R`.

QuantUp (Data analysis, modeling and training), Wroclaw, Poland

Intern **Jul 2013 - Apr 2014**

- Performed research and case-study analysis of building and validating scoring models.
- Wrote articles about reproducible research tools and large-size data analysis tools in `R`.

Computer Skills

- Experienced: `R`, `Python`, `SQL`.

Competitions and Hackatons

1. 2nd place in Data Analysis Marathon: "Determining tabloidization index". Krakow, Poland, Nov 2015.
2. Participation in "HackZurich // The biggest European hackathon". Zurich, Switzerland, Oct 2015.
3. The Winner of the Schneider Electric Business Analyst Competition 2015. Wroclaw, Poland, Jun 2015.

4. 2nd place in the Independent National Data Analysis Competition "NOMAD" V edition 2015. Wroclaw, Poland, Jun 2015.
5. 2nd place in the Independent National Data Analysis Competition "NOMAD" IV edition 2014. Wroclaw, Poland, Jun 2014.
6. The Winner of the KRUK Analytics Challenge 2014. Wroclaw, Poland, May 2014.