Kylie Ariel Bemis

(formerly Kyle Dwayne Bemis)

August 15, 2017

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Postdoctoral Future Faculty Fellow
College of Computer & Information Science, Northeastern University
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Research interests

Computer languages and environments for data analysis, computational methods for statistical inference, data visualization, massive data, machine learning, computational linguistics, spatial statistics.

Education

2016	Ph.D., Statistics, Purdue University
2011	M.S., Applied Statistics, Purdue University
2010	B.S., Statistics and Mathematics, Purdue University

Awards

2015	John M. Chambers Statistical Software Award, American Statistical Association.
2012	Graduate Research Fellowship, National Science Foundation.
2011	Indigenous Graduate Partnership Scholarship, 2011, Alfred P. Sloan Foundation.
2008	Zeta of Indiana Chapter Member, Phi Beta Kappa Society
2008	National Merit Scholarship, National Merit Scholarship Corporation
2007	Purdue University Academic Success Award, Purdue University
2007	Indiana Resident Top Scholar Award, Purdue University
2007	Class of 1954 Presidential Scholarship, Purdue University
2007	Presidential Scholar Candidate, U.S. Presidential Scholars Program

Experience

08/15-present
Future Faculty Fellow. College of Computer and Information Science, Northeastern University, Boston, MA.
- Develop statistical computing infrastructure for high-throughput imaging experiments. Supervisor Olga Vitek.

01/15-05/15
Teaching Assistant. Dpt. of Statistics, Purdue University, W. Lafayette, IN.
- Led computer labs, help sessions, grade homework, and proctor exams. Supervisor Laura Cayon.

01/13-06/13	Intern. Canary Center for Cancer Early Detection, Stanford University, Palo Alto, CA.
	• Develop open-source software package for MALDI-imaging experiments. Supervisor Mark Stolowitz.
08/11-05/12	Research Assistant. Dpt. of Statistics, Purdue University, W. Lafayette, IN.
	• Develop methods for statistical analysis of DESI-imaging experiments. Supervisor Olga Vitek.
08/11-05/12	Member. Statistical Consulting Service, Dpt. of Statistics, Purdue University, W. Lafayette, IN.
	• Design experiments and statistical analyses for students, faculty, and staff. Supervisor Bruce Craig.
06/09-05/10	Summer Intern. School of Aeronautics and Astronautics, Purdue University, W. Lafayette, IN.
	• Data mining of large airline itinerary databases. Supervisor Daniel DeLaurentis.
08/09–12/09	Teaching Assistant. Dpt. of Mathematics, Purdue University, W. Lafayette, IN.
	• Lead computer labs, help sessions, and grade homework. Supervisor Min Chen.

Publications

1. **K. D. Bemis**, A. Harry, L. S. Eberlin, C. Ferreira, S. M. van de Ven, P. Mallick, M. Stolowitz, and O. Vitek. "`Cardinal`: an R package for statistical analysis of mass spectrometry-based imaging experiments." *Bioinformatics.* 2015. doi:10.1093/bioinformatics/btv146

2. S. van de Ven, **K. D. Bemis**, K. Lau, R. Adusumilli, U. Kota, M. Stolowitz, O. Vitek, P. Mallick, S. S. Gambhir. "Protein biomarkers on tissue as imaged via MALDI mass spectrometry: A systematic approach to study the limits of detection." *Proteomics.* 2016. doi:10.1002/pmic.201500515

3. **K. D. Bemis**, A. Harry, L. S. Eberlin, C. Ferreira, S. M. van de Ven, P. Mallick, M. Stolowitz, and O. Vitek. "Probabilistic segmentation of mass spectrometry images helps select important ions and characterize confidence in the resulting segments." *Molecular & Cellular Proteomics.* 2016. doi:10.1074/mcp.O115.053918

4. **K. A. Bemis** and O. Vitek. "`matter`: an R package for rapid prototyping with larger-than-memory datasets on disk." *Bioinformatics.* 2017. doi:10.1093/bioinformatics/btx392

Software

Cardinal A mass spectrometry imaging toolbox for statistical analysis

- Available as a free and open-source `R` package on Bioconductor.
- News, installation instructions, and example workflows and datasets are available at
- `http://www.cardinalmsi.org`
- Source code for *Cardinal* and its example workflows are available at
- `https://github.com/kuwisdelu/Cardinal`

matter A framework for rapid prototyping with data on disk

- Available as a free and open-source `R` package on Bioconductor.
- Source code for *Cardinal* and its example workflows are available at
- https://github.com/kuwisdelu/matter

Presentations

1. K. A. Bemis and O. Vitek. "R-Based Computing with Big Data on Disk." *use R! 2017 Conference*, Brussels, Belgium, 2017.

2. K. A. Bemis and O. Vitek. "Scalable Analysis of Mass Spectrometry Imaging Experiments." *International Chinese Statistical Association (ICSA) Applied Statistics Symposium*, Chicago, IL, 2017.

3. K. D. Bemis, A. Harry, D. Calligaris, A. Changelian, S. Santagata, N. Agar, and O. Vitek. "Supervised and Unsupervised Analysis of Mass Spectrometry Imaging Experiments Using Cardinal." *US HUPO 12th Annual Conference*, Boston, MA, 2016.

4. K. D. Bemis, L. S. Eberlin, C. Zheng, C. Ferreira, R. G. Cooks, and O. Vitek. "Statistically Visualizing the Mass Spectra: Integrating chemistry and statistics to discover new biological insights with DESI-imaging." *American Indian Science and Engineering Society National Conference*, Anchorage, AK, 2012.

5. K. D. Bemis, L. S. Eberlin, C. Zheng, C. Ferreira, R. G. Cooks, and O. Vitek. "A Workflow for Efficient Processing and Spatial Segmentation (with Automated Feature Selection) for DESI Imaging Mass Spectrometry." *Bioinformatics Seminar Series*, Purdue University, W. Lafayette, IN, 2012.

6. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Regularized Spatial Segmentation of DESI Imaging Mass Spectrometry Data using Spatially-Aware Sparse Clustering." *MS-SIG: Computational Challenges in High-Throughput Proteomics*, Long Beach, CA, 2012.

7. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Regularized Spatial Segmentation of DESI Imaging Mass Spectrometry Data using Spatially-Aware Sparse Clustering." *International Society for Computational Biology Student Council Symposium*, Long Beach, CA, 2012.

8. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Signal Processing and Spatial Segmentation of DESI Imaging Mass Spectrometry Data with Regularized and Spatially-Aware Clustering." *RECOMB Satellite Conference on Computational Proteomics*, La Jolla, CA,, 2012.

Posters

1. K. D. Bemis, L. S. Eberlin, C. Ferreira, S. van de Ven, P. Mallick, M. Stolowitz, and O. Vitek. "Cardinal: open-source R package for statistical analysis of 2D and 3D mass spectrometry imaging experiments" *62nd American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics*, Baltimore, MD, 2014.

2. K. D. Bemis, L. S. Eberlin, C. Ferreira, S. van de Ven, P. Mallick, R. G. Cooks, M. Stolowitz, and O. Vitek. "Discovering Spatio-Chemical Structure in Tissue: Cardinal Software and Methods for Analysis of Mass Spectrometry Images." *American Indian Science and Engineering Society National Conference*, Denver, CO, 2013.

3. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Challenges in Between-Tissue Variation in DESI-Imaging: Spatial Segmentation of Multiple Sections of a Fetal Pig." *Scientific Meeting of the 3D-Massomics European Project*, Saint-Malo, France, 2013.

4. K. D. Bemis, L. S. Eberlin, C. Ferreira, S. van de Ven, P. Mallick, R. G. Cooks, M. Stolowitz, and O. Vitek. "Cardinal: open-source software for spatially-aware feature-sparse segmentation and classification of mass spectrometry images." *61st American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics*, Minneapolis, MN, 2013.

5. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Regularized Spatial Segmentation of DESI Imaging Mass Spectrometry Data using Spatially-Aware Sparse Clustering." *20th Annual International Conference on Intelligent Systems for Molecular Biology*, Long Beach, CA, 2012.

6. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Regularized Spatial Segmentation of DESI Imaging Mass Spectrometry Data using Spatially-Aware Sparse Clustering." *International Society for Computational Biology Student Council Symposium*, Long Beach, CA, 2012.

7. K. D. Bemis, L. S. Eberlin, C. Ferreira, R. G. Cooks, and O. Vitek. "Signal Processing and Spatial Segmentation of DESI Imaging Mass Spectrometry Data with Regularized and Spatially-Aware Clustering." *RECOMB Satellite Conference on Computational Proteomics*, La Jolla, CA, 2012.

8. K. D. Bemis, L. S. Eberlin, C. Zheng, C. Ferreira, R. G. Cooks, and O. Vitek. "Processing and Analysis of DESI Imaging Mass Spectrometry Data in Supervised and Unsupervised Settings." *American Indian Science and Engineering Society Regional Conference – Region VI*, Purdue University, W. Lafayette, IN, 2012.

Computing Skills

R, S-PLUS, SAS, C, C++, Java, Matlab, LaTeX

Outreach

09/14-08/15	Secretary. Purdue chapter, American Indian Science and Engineering Society (AISES)
06/14	Mentor. Minority Education Through Traveling and Learning in the Sciences (METALS). Alaska Native/rural Alaskan high school students, Anchorage & Fairbanks, AK
09/13-08/14	President. Purdue chapter, American Indian Science and Engineering Society (AISES)
09/11-08/13	Vice President. Purdue chapter, American Indian Science and Engineering Society (AISES)
06/12	Mentor. Minority Education Through Traveling and Learning in the Sciences (METALS). Underrepresented minority high school students, Rocky Mountain Region.
06/12	Presenter. Alaska Native Science and Engineering Program (ANSEP) Acceleration Academy. University of Alaska, Anchorage, AK.
03/12	Co-organizer. American Indian Science and Engineering Society (AISES) Regional Conference.

Professional memberships

American Statistical Association (ASA)

American Society for Mass Spectrometry (ASMS)

American Indian Science and Engineering Society (AISES)

National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP)