Iain Carmichael

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Work

Incoming Postdoctoral Fellow Fall 2021-
Harvard Medical School, Brigham and Women's Hospital
Memorial Sloan Kettering Cancer Center, Warren Alpert Center for Digital and Computational Pathology
Faisal Mahmood Lab

NSF Mathematical Sciences Postdoctoral Research Fellowship June 2019 - Summer 2021
Department of Statistics, University of Washington

Education

The University of North Carolina at Chapel Hill May 2019
Ph.D. Statistics
Department of Statistics and Operations Research
Thesis: *Probabilistic and geometric approaches to the analysis of non-standard data*
Advisors: Shankar Bhamidi, J.S. Marron

Cornell University May 2014
B.A. Mathematics, Physics

Budapest Semesters in Mathematics Spring 2013
Semester abroad

Publications

Links to all publicly available manuscripts may be found at https://idc9.github.io/research.html

In preparation, manuscript available

1. **Carmichael, I.**, Thomas, K., Giertych, N., Williams, J.P. (2021). yaglm: a Python package for fitting and tuning generalized linear models that supports structured, adaptive and non-convex penalties. *arXiv preprint arXiv:2110.05567.*
2. Gazzola, M.G., **Carmichael, I.**, Barry, D. (2021). An investigation of the relationship between housing status, patient characteristics, and retention among outpatient medication for opioid use disorder in the United States. *Manuscript available upon request.*
3. Bassir, A.N., Parvez, L., Madden, L.M., Beitel, M., Gazzola, M.G., **Carmichael, I.**, Barry, D. (2021). Cannabis use and lifetime trauma history in treatment-seeking individuals with opioid use disorder. *Manuscript available upon request.*

Under Review

4. **Carmichael, I.**. (2021). The folded concave Laplacian spectral penalty learns block diagonal sparsity patterns with the strong oracle property. *Under review.*
5. Gazzola, M.G., **Carmichael, I.**, Madden, L.M., Dasgupta, N., Beitel, M., Zheng, X., Eggert, K., Farnum, S., Barry, D. (2021). The relationship between housing status, patient characteristics, and retention among individuals enrolled in low-barrier-to-treatment-access methadone maintenance treatment. *Under review.*

6. **Carmichael, I.**. (2020). Learning sparsity and block diagonal structure in multi-view mixture models. *Under review.*

7. Banerjee, S., Bhamidi, S., **Carmichael, I.** (2018). Fluctuation bounds for continuous time branching processes and nonparametric change point detection in growing networks. *Under review.*

Published

8. **Carmichael, I.**, Marron, J.S. (2021). Geometric insights into support vector machine behavior using the KKT conditions. *Electronic Journal of Statistics. To appear.*

9. Perry, R., Mischler, G., Guo, R., Lee, T., Chang, A., Koul, A., Franz, C., Richard, H., **Carmichael, I.**, Ablin, P. and Gramfort, A. (2021). mvlearn: multiview machine learning in Python. *Journal of Machine Learning Research, 22(109), pp.1-7.*

10. **Carmichael, I.**, Calhoun, B.C., Hoadley, K.A., Troester, M.A., Geradts, J., Couture, H.D., Olsson, L,. Perou, C.M., Niethammer, M., Hannig, J., Marron, J.S. (2021). Joint and individual analysis of breast cancer histologic images and genomic covariates. *The Annals of Applied Statistics. To appear.*

11. **Carmichael, I.**, Williams, JP. (2018). An exposition of the false confidence theorem. *Stat, 7(1), e201.*

12. **Carmichael, I.**, Marron J.S. (2018). Data science vs. statistics: two cultures?. *Japanese Journal of Statistics and Data Science, 1(1), 117-138.*

13. **Carmichael, I.**, Wudel, J., Kim, M., Jushchuk, J. (2017). Examining the evolution of legal precedent through citation network analysis. *NCL Rev. 96 (2017): 227.*

Talks and posters

"The folded concave Laplacian spectral penalty learns block diagonal sparsity patterns with the strong oracle property," *UNC Chapel Hill, STOR Department*, Chapel Hill, NC, September, 2021.

"The folded concave Laplacian spectral penalty learns block diagonal sparsity patterns with the strong oracle property," *University of Washington, Department of Statistics*, Seattle, WA, June, 2021.

"Sparsity structure estimation for multi-view mixture models," *University of Washington, Department of Statistics*, Seattle, WA, May, 2020.

"Joint and individual analysis of breast cancer histologic images and genomic covariates," *Harvard Medical School*, Boston, MA, December, 2019.

"Joint and individual analysis of histopathology images and genetic covariates," *Computational Medicine Group*, Chapel Hill, NC, May, 2019.

"Fusion of image and genetic data with convolutional neural networks and AJIVE," *Bayesian, Fiducial, and Frequentist (BFF) Conference*, Durham, NC, April, 2019. (*poster*) https://idc9.github.io/assets/carmichael_bff_2019_compressed.pdf

"Angle-based joint and individual variation explained with applications to image and genetic data," *University of Illinois Urbana–Champaign, Department of Statistics*, Urbana, IL, February, 2019.

"Angle-based joint and individual variation explained with applications to image and genetic data," *University of Wisconsin–Madison, Department of Statistics*, Madison, WI, January, 2019.

"Angle-based joint and individual variation explained with applications to image and genetic data," *Harvard University, Department of Biostatistics*, Boston, MA, January, 2019.

"Angle-based joint and individual variation explained with applications to image and genetic data," *FocuStat Combo Kitchen*, Oslo, Norway, November, 2018.

"Angle-based joint and individual variation explained," *Joint PI Meeting: NSF BIGDATA and Big Data Hubs & Spokes*, Alexandria, VA, June, 2018. (*poster*) https://idc9.github.io/assets/ajive_carmichael_nsf_bigdata2018_poster.pdf

"Joint analysis of H&E stained images and genetic covariates using deep learning and AJIVE," *GenStat Group*, Chapel Hill, NC, September, 2018.

"Word embeddings for computational humanities," *UNC Digital Innovation Lab*, Chapel Hill, NC, October 2017. https://github.com/idc9/word_embed_tutorial

"Data science and the undergraduate curriculum," *UNC STOR Department Colloquium*, Chapel Hill, NC, September 2017. https://idc9.github.io/assets/data_science_stor_colloquium.pdf

"Open data, networks and the law," *PyData Carolinas*, Raleigh, NC, October, 2016.

Professional Experience

Consultant, Reese News Lab, *Chapel Hill, NC* — Spring - Fall 2017

Research Scientist, Gamalon Machine Intelligence, *Cambridge, MA* — May - August 2016

Teaching

Instructor, STOR-BIOS Linear Algebra Summer Boot Camp, *UNC, Chapel Hill, NC* — Summer 2017

Instructor, STOR 390: Introduction to Data Science, *UNC, Chapel Hill, NC* — Spring 2017

- Created and taught the first data science course for UNC's undergraduate statistics major. https://idc9.github.io/stor390/
- Covered topics such as: R programming, machine learning, and ethics for data science.
- The course is now a permanent part of the undergraduate curriculum and is taken by over 400 students a year.

Graduate Research Consultant, JOMC 390: Data Driven Journalism, *UNC, Chapel Hill, NC* Spring 2016

Teaching Assistant, *UNC, Chapel Hill, NC*

- STOR 634: Measure Theory — Fall 2015
- STOR 113: Decision Models for Business and Economics — Fall 2014 - Spring 2015

Undergraduate Student Thesis Supervisor (co-advising with Prof. Bhamidi), *UNC, Chapel Hill, NC*

- Kate Cho (statistics) — Spring 2016
- Michael Kim (statistics) — Spring 2016 - Spring 2017
- James Jushchuk (computer science) — Spring 2016 - Spring 2018
- Scott Garcia (statistics) — Fall 2016
- Ethan Koch (statistics) — Spring 2017 - Spring 2018
- Charles Tang (computer science) — Spring 2019

Awards

The Walter Deemer Excellence in Teaching Award, *UNC, Chapel Hill*, NC — December 2018

Dean's Graduate Fellow in the College of Arts and Sciences, *UNC, Chapel Hill*, NC — 2018-2019

Grant from Data@Carolina (with Prof. Bhamidi), *UNC, Chapel Hill*, NC — Fall 2016

Regional Datathon winner (team of 4 winning $20,000 data science competition sponsored by Citadel), *Duke University, Durham, NC* — April 2017

5th place in international Data Open Championship sponsored by Citadel, *Manhattan, NY* November 2017

Professional Service and Activities

Referee for: Journal of Machine Learning Research, IEEE Transactions on Neural Networks and Learning Systems, Journal of Applied Probability, STAT, Journal of Computational and Graphical Statistics, SIAM Journal on Mathematics of Data Science, Bioinformatics, The Conference on Uncertainty in Artificial Intelligence

JMLR Editorial Board Reviewer 2020-

Reader for the UW statistics department's graduate admissions committee Fall 2021

Allen Institute for Brain Science, Summer Workshop on the Dynamic Brain Summer 2019

UNC middle/high school science exposition, *UNC, Chapel Hill, NC* Spring 2018
https://github.com/idc9/UNC_science_expo_2018

Member of Evidence, Analysis, Interpretation, and Critique task force for UNC's Curriculum Development Committee, *UNC, Chapel Hill, NC* Spring 2017

Coach of UNC's undergraduate team competing in DataFest, *Duke University, Durham, NC* 2016 - 2017

Tutorials on R, Python, data science, optimization and natural language processing can be found on my github page (github.com/idc9) 2015 - present

References

J.S. Marron
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Associate Professor of Statistics (919) 843-2431
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University Washington

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Yale School of Medicine