Carter Allen

Contact Information

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Education

Spring 2022 **Doctor of Philosophy** in Biomedical Informatics[†]
The Ohio State University, Columbus OH.
Advisor: Prof. Dongjun Chung
[†] *First 2.5 years of PhD in Biostatistics completed at Medical University of South Carolina, Charleston SC.*

Spring 2017 **Bachelor of Science** in Statistics
University of South Carolina, Columbia SC.
South Carolina Honors College | Magna Cum Laude
Thesis: "A Comparison of Imputation Algorithms for Modeling Water Quality"

Publications

JHO (2022) | **Allen C.** and Song N.J. and Vilgelm A.E. and Riesenberg B.P., Weller K.P., Reynolds K., Chakravarthy K.B., Kumar A., Khatiwada A., Sun Z., Ma A., Chang Y., Yusuf M., Li A., Zeng C., Evans J.P., Bucci D., Gunasena M., Xu M., Liyanage N.P.M., Bolyard C., Velegraki M., Liu S.L., Ma Q., Devenport M., Liu Y., Zheng P., Malvestutto C.D., Chung D., and Li Z. (2021). "Treatment with soluble CD24 attenuates COVID-19-associated systemic immunopathology" *Journal of Hematology & Oncology*.

Frontiers (2021) | **Allen C.**, Kuhn B.N., Cannella N., Crow A.D., Roberts A.T., Lunerti V., Ubaldi M., Hardiman G., Solberg Woods L. Ciccocioppo R., Kalivas P., and Chung D. (2021). "Network-based discovery of opioid use vulnerability in rats using the Bayesian stochastic block model." *Frontiers in Psychiatry*.

Bioinformatics (2021) | **Allen C.** and Chang Y., Wan C., Chung D., Zhang C., Li Z., Ma Q. (2021). "IRIS-FGM: an integrative single-cell RNA-Seq interpretation system for functional gene module analysis." *Bioinformatics*.

Biometrics (2020) | **Allen C.**, Benjamin-Neelon S.E., Neelon B. (2020). "A Bayesian multivariate mixture model for skewed longitudinal data with intermittent missing observations: An application to infant motor development." *Biometrics*.

Pediatrics (2020) | Benjamin-Neelon S.E., **Allen C.**, Neelon B. (2020). "Household food security and infant adiposity." *Pediatrics*.

Publications *Continued...*

BMJ Open (2019)	Gonzalez-Nahm S., Hoyo C., Ostbyte T., Neelon B., **Allen C.**, Benjamin-Neelon S.E. (2019). "Associations of maternal diet with infant adiposity at birth, 6 months and 12 months." *BMJ Open*.
PLOS One (2019)	Couch D., Yu Z., Nam J.H., **Allen C.**, Ramos P.S., da Silveira W.A., Hunt K.J., Hazard E.S., Hardiman G., Lawson A., and Chung D. (2019). "GAIL: An interactive webserver for inference and dynamic visualization of gene-gene associations based on gene ontology guided mining of biomedical literature." *PLOS One*.

Manuscripts Under Peer Review

Nat. Comm. (2021)	Chang Y., He F., Wang J., Chen S., Li J., Liu J., Yu Y., Su L., Ma A. **Allen C.**, Lin Y., Sun S., Liu B., Otero J., Chung D., Fu H., Li Z., Xu D., and Ma Q. (2021). "RESEPT: tissue architecture inference and visualization from spatially resolved transcriptomics." Submitted to *Nature Communications*.
Biometrics (2021)	**Allen C.**, Chang Y., Neelon B., Chang W., Kim H.J., Li Z., Ma Q., and Chung D. (2021). "A Bayesian multivariate mixture model for spatial transcriptomics data." Submitted to *Biometrics*.
Science (2021)	Kwon H., Chung D., Kaneko S., Li A., Ma A., Schafer J.M., Zhou L., Riesenberg B.P., Song N.J., Chang Y., Xiao T., **Allen C.**, Sundi D., Oh D.Y., Fong L., Ma Q., Li X., and Li Z. (2021). "Sex Differences in CD8+ T Cell Programming in the Tumor Microenvironment" Submitted to *Science*.

Software Development

`maple`*	Bayesian modeling of multi-sample spatial transcriptomics data. *GitHub*.
`banyan`*	Network-based modeling of spatial transcriptomics data. *GitHub*.
`spruce`*	Bayesian modeling of spatial transcriptomics data. *GitHub*.
`IRISFGM`	Functional gene module analysis of RNA-seq data. *Bioconductor*.
`mlsbm`*	Efficient Bayesian multilevel stochastic blockmodels using C++. *CRAN*.
`GPA`	Genetic analysis incorporating pleiotropy and annotation. *Bioconductor*.
`GGPA`	A graphical model for prioritizing GWAS results. *Bioconductor*.
`dpeak`	Deconvolution of peaks in ChIP-seq analysis. *Bioconductor*.
`BayesMSN`*	Bayesian mixture models for skewed longitudinal data. *GitHub*.
`CRT`*	Generate chinese restaurant table random variables in C++. *GitHub*.

*Denotes primary author and maintainer.

Presentations

International	**Allen C.** *SPRUCE: Bayesian Multivariate Mixture Models for High-Throughput Spatial Transcriptomics Data.* Joint Statistical Meetings 2021. August 8th, 2021. Online due to COVID-19.
National	**Allen C.** *A statistical framework for network-based discovery of opioid use sub-populations in rats using the Bayesian stochastic block model.* National Institute on Drug Abuse 2021. March 8th, 2021. Online due to COVID-19.
International	**Allen C.** *A Bayesian Multivariate Skew-Normal Mixture Model for Longitudinal Data with Intermittent Missing Observations: An Application to Infant Motor Development.* International Biometrics Society Eastern North American Region. March 24th, 2020. Online due to COVID-19.

Presentations *cont...*

International	**Allen C.** *A Multivariate Generalized Linear Mixed Model for Joint Modeling of Cognitive and Neuroimaging Outcomes.* International Chinese Statistical Association Applied Statistics Symposium. June 11th, 2019. Raleigh, NC.
National	**Allen C.** *A novel Bayesian modeling framework for clustering infant growth trajectories.* Southern Regional Council on Statistics 2019 Summer Research Conference. June 3rd, 2019. Carollton, KY.
State	**Allen C.** *Bayesian Skew-Normal and Skew-t Models of Birthweight and Food Security.* South Carolina American Statistical Association Fall Meeting. October 13th, 2018. Clemson, SC.
On-Campus	**Allen C.** *Using Shiny in a Modern Workflow for Statistics.* MUSC Department of Public Health Sciences Brownbag Seminar Series. February 4th, 2019. Charleston, SC.
On-Campus	**Allen C.** *Bayesian Skew-Normal and Skew-t Models of Birthweight and Food Security.* Perry V. Halushka MUSC Research Day. November 2nd, 2018. Charleston, SC.
On-Campus	**Allen C.** *A Comparison of Imputation Algorithms for Modeling Water Quality.* University of South Carolina Discover USC Research Day. April 21st, 2017. Columbia, SC.

Research Groups

Summer 2020-Current | Dr. Zihai Li's Research Group, The Ohio State University.
Researcher in Statistical Genetics and Bioinformatics
Attended weekly meetings with researchers developing statistical models and analysis pipelines for single cell spatial transcriptomics, flow cytometry, RNA-sequencing, and TCR-sequencing experiments in the contex of immuno-oncology. Served as a statistician for a clinical trial investigating a novel therapeutic for severe COVID-19.

Spring 2018-Current | Dr. Dongjun Chung's Research Group, The Ohio State University and Medical University of S.C.
Researcher in Statistical Genetics and Bioinformatics
Attended weekly meetings with researchers developing methods for discovering gene-gene relations using literature mining data. Developed statistical models and bioinformatics pipelines for a variety of application areas including spatial transcriptomics and behavioral modeling.

Summer 2018-Fall 2019 | Dr. Brian Neelon's Research Group, Medical Univ. of S.C.
Researcher in Bayesian Models for Infant Development
Attended weekly meetings with researchers developing models for clustering longitudinal infant growth trajectories.

Fall 2016-Spring 2017 | Undergraduate researcher with Dr. Edsel Peña, Univ. of S.C.
Researcher in Missing Data Methods and Water Quality Monitoring
Studied novel and existing methods for dealing with missing and censored data in the context of predictive water quality monitoring.

Teaching

Fall 2018 | Medical University of South Carolina, Dept. of Public Health Sciences
Clinical Biostatistics
Taught a lab section of Clinical Biostatistics – an introductory statistics course taught to a general audience of graduate students. Created and maintained a class website with teaching materials on SPSS and statistical concepts.

Work Experience

Summer 2017 | Tutor at Wyzant.com
Mathematics and Statistics Tutor
Tutor students in high school and college mathematics and statistics and assist researchers with statistical research questions. 5 star rating over 50+ hours.

Summer 2016 | Sustainability Intern at College of Charleston
Independent researcher in water quality in Charleston, SC
Researched the current state of water quality in Charleston, SC using multi-year data from Charleston Waterkeeper. Developed research as a part of the Office of Sustainability's Green Roofs initiative.

Summer 2015 | Intern at Charleston Waterkeeper, *Plastics Initiative and Water Quality Monitoring Program*
Sampled water quality at fifteen sites around Charleston, SC on a weekly basis and helped with background research for Charleston Waterkeeper's plastics initiative.

Technical Skills

Proficiency:	R, SAS, Linux, LaTeX, Git
Competency:	C++, SQL, Python, Java
Familiarity:	Tableau, Stan, WinBUGS, JAGS

Other Training

June 2019	ICSA 2019 Appied Statistics Symposium *International Chinese Statistical Association* Completed the short course in *Statistical Analysis of Network Data*
May 2019	May Institute for computation and statistics for mass spectrometry and proteomics *Northeastern University* Participated in *Advanced R* and *Visialization of biomolecular data* workshops

Awards

Summer 2019	R.L. Anderson Student Poster Award (SRCOS Conference 2019)
Summer 2019	Boyd Harshbarger Student Travel Award (SRCOS Conference 2019)
Spring 2019	Travel Fellowship to May Institute at Northeastern University
Spring 2017	Mu Sigma Rho Award for Undergraduate Statistics Major
Spring 2017	2^{nd} place poster at USC Discover Day
Spring 2017	Magellan Scholar Undergraduate Research Grant
Summer 2015	Bank of America Undergraduate Scholarship
Summer 2014	EPA Undergraduate Scholarship