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722 West 168th street, R217, New York, NY10032

Mental Health Data Science Division

New York State Psychiatric Institute

Columbia University Irving Medical Center

ACADEMIC APPOINTMENTS

Assistant Professor of Data Science (tenure-track)

AUG 2023 – PRESENT

School of Data Science, University of Virginia

EDUCATION

Columbia University

AUGUST 2023

Postdoc Training in Clinical Biostatistics and Psychiatry, COLUMBIA UNIVERSITY IRVING MEDICAL CENTER

Tulane University

MAY 2021

Ph.D. in Biomedical Engineering, SCHOOL OF SCIENCE AND ENGINEERING

GPA 3.81/4.0

Dissertation: *Study brain functional connectivity using graphical models*

Committee members: Yu-Ping Wang (Chair), Donald P. Gaver, Department of Biomedical Engineering

Jihun Hamm, Department of Computer Science

Hongwen Deng, Department of Biostatistics and Data Science

Research Field: Brain imaging, Imaging (epi)genetics

Concentration: Network analysis, Probabilistic graphical models (directed/ undirected)

University of Science and Technology of China (USTC)

JUN 2014

B.Sc. in Statistics, SCHOOL FOR THE GIFTED YOUNG

GPA 3.63/4.0

RESEARCH EXPERIENCE

Research Scientist II

New York State Psychiatric Institute

Mental Health Data Science Division

JULY 2021 – PRESENT

Mentor: Seonjoo Lee

Cognitive Development & Neuroimaging Laboratory

FEB 2022 – PRESENT

Mentor: Rachel Marsh

Research Assistant

Tulane University

Department of Biomedical Engineering

JAN 2016 – MAY 2021

Mentor: Yu-Ping Wang

Research Assistant

University of Florida

Department of Biostatistics

AUG 2014 – DEC 2015

PUBLICATIONS

First Author

Zhang, A., Cai, B., Hu, W., Jia, B., Liang, F., Wilson, T. W., Stephen, J. M., Calhoun, V. D. and Wang, Y.-P. (2020). Joint Bayesian-incorporating estimation of multiple Gaussian graphical models to study brain connectivity development in adolescence. *IEEE transactions on medical imaging*. vol. 39, no. 2, pp. 357-365.

- Zhang, A.**, Fang, J., Hu, W., Calhoun, V. D., and Wang, Y.-P. (2019). A Latent Gaussian Copula Model for Mixed Data Analysis in Brain Imaging Genetics. *IEEE/ACM transactions on computational biology and bioinformatics*. vol. 18, no. 4, pp. 1350-1360.
- Zhang, A.**, Fang, J., Liang, F., Calhoun, V. D. and Wang, Y.-P.(2019). Aberrant Brain Connectivity in Schizophrenia Detected via a Fast Gaussian Graphical Model. *IEEE journal of biomedical and health informatics*. vol. 23, no. 4, pp. 1479-1489.
- Zhang, A.**, Zhang, G., Calhoun, V. D. and Wang, Y.-P. (2020, March). Causal brain network in schizophrenia by a two-step Bayesian network analysis. In *Medical Imaging 2020: Imaging Informatics for Healthcare, Research, and Applications* (Vol. 11318, p. 1131817). International Society for Optics and Photonics.
- Zhang, A.**, Calhoun, V. D. and Wang, Y.-P. (2019, March). Joint Gaussian copula model for mixed data with application to imaging epigenetics study of schizophrenia. In *Medical Imaging 2019: Imaging Informatics for Healthcare, Research, and Applications* (Vol. 10954, p. 109540R). International Society for Optics and Photonics.
- Zhang, A.**, Fang, J., Calhoun, V. D. and Wang, Y.-P. (2018, April). High dimensional latent Gaussian copula model for mixed data in imaging genetics. In *2018 IEEE 15th International Symposium on Biomedical Imaging (ISBI 2018)* (pp. 105-109).
- Zhang, A.**, Jia, B. and Wang, Y.-P. (2018, March). Tracking the development of brain connectivity in adolescence through a fast Bayesian integrative method. In *Medical Imaging 2018: Imaging Informatics for Healthcare, Research, and Applications* (Vol. 10579, p. 105790O). International Society for Optics and Photonics.

Co-Author

- Zhang, G., Cai, B., **Zhang, A.**, Tu, Z., Xiao, L., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y. P. (2022). Detecting abnormal connectivity in schizophrenia via a joint directed acyclic graph estimation model. *NeuroImage*, 260, 119451.
- Cai, B., Zhou, Z., **Zhang, A.**, Zhang, G., Xiao, L., J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2022) Functional connectomes incorporating phase synchronization for the characterization and prediction of individual differences. *Journal of Neuroscience Methods*, 372, 109539.
- Cai, B., Zhang, G., **Zhang, A.**, Xiao, L., Hu, W., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2021) Functional connectome fingerprinting: Identifying individuals and predicting cognitive functions using refined brain connectivity. *Human Brain Mapping* 42.9, 2691-2705.
- Hu, W., Meng, X., Bai, Y., **Zhang, A.**, Cai, B., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2021) Interpretable multimodal fusion networks reveal mechanisms of brain cognition. *IEEE Transactions on Medical Imaging*, vol. 40, no. 5, pp. 1474-1483.
- Xiao, L., **Zhang, A.**, Cai, B., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2021) Correlation Guided Graph Learning to Estimate Functional Connectivity Networks from fMRI Data. *IEEE Transactions on Biomedical Engineering*, vol. 68, no. 4, pp. 1154-1165.
- Zhou Z., Cai, B., Zhang, G., **Zhang, A.**, Calhoun, V. D. and Wang, Y.-P. (2021) Prediction and classification of sleep quality based on phase synchronization related whole-brain dynamic connectivity using resting state fMRI. *NeuroImage*, 221, 117-190.
- Cai, B., Zhang, G., **Zhang, A.**, Hu, W., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2020). A GICA-TVGL framework to study sex differences in resting state fMRI dynamic connectivity. *Journal of Neuroscience Methods*, 332, p.108531.
- Cai, B., Zhang, G., Hu, W., **Zhang, A.**, Zille, P., Zhang, Y., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2019). Refined measure of functional connectomes for improved identifiability and prediction. *Human brain mapping*,

40(16), pp.4843-4858.

Zhang, G., Cai, B., **Zhang, A.**, Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2020). Estimating Dynamic Functional Brain Connectivity with a Sparse Hidden Markov Model. IEEE transactions on medical imaging, vol. 39, no. 2, pp. 488-498.

Hu, W., **Zhang, A.**, Cai, B., Calhoun, V. D. and Wang, Y.-P. (2019). Distance canonical correlation analysis with application to an imaging-genetic study. Journal of Medical Imaging, 6(2), 026501.

Hu, W., Cai, B., **Zhang, A.**, Calhoun, V. D. and Wang, Y.-P. (2019). Deep collaborative learning with application to multimodal brain development study. IEEE Transactions on Biomedical Engineering, 66(12), 3346-3359.

Cai, B., Zhang, G., **Zhang, A.**, Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. (2018). Capturing dynamic connectivity from resting state fMRI using time-varying graphical LASSO. IEEE Transactions on Biomedical Engineering, 66(7), 1852-1862.

Zhang, G., **Zhang, A.**, Calhoun, V. D. and Wang, Y.-P. (2020, February). A causal brain network estimation method leveraging Bayesian analysis and the PC algorithm. In Medical Imaging 2020: Biomedical Applications in Molecular, Structural, and Functional Imaging (Vol. 11317, p. 113170X). International Society for Optics and Photonics.

Under Review

Sun, L., **Zhang, A.**, Liang, F. Consistent Dynamic Bayesian Network Learning for a fMRI Study of Emotion Processing. Submitted to Annals of the Applied Statistics.

Zhang, A., Pagliaccio, D., Marsha, R., Lee, S. Decoding Age-specific Changes in Brain Functional Connectivity Using a Sliding-window Based Clustering Method. Submitted to Human Brain Mapping.

Zhang, A., Zhang, G., Cai, B., Xiao, L., Hu, W., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. Functional Connectivity Estimation using Correlation-guided Bayesian Network to Understand Cognitive Ability Variations. Submitted to Human Brain Mapping.

Under Preparation

Zhang, A., Zhang, G., Cai, B., Stephen, J. M., Wilson, T. W., Calhoun, V. D. and Wang, Y.-P. A Bayesian incorporated linear non-Gaussian acyclic model for multiple directed graph estimation to study brain emotion circuit development in adolescence.

Zhang, A., Zhu X., Wrengler, K., Horga, G., Goldberg, T., Lee, S. Distinct hierarchical alterations of intrinsic neural timescales account for mild cognitive impairment (MCI) to Dementia.

TEACHING EXPERIENCE

Advisor of Undergraduate Research, Department of Biomedical Engineering	Tulane University
Student: Jason Dent	JAN 2018 – DEC 2018
Thesis: Using a Multilayer Perceptron to Categorize fMRI Data	
Teaching Assistant, Department of Biostatistics	University of Florida
Biostatistical Computing with SAS	SEP 2015 - DEC 2015
<ul style="list-style-type: none">• Prepared lectures for lab sessions using SAS and conducted discussions with students• Graded, provided correct homework solutions, provided office hours	
Advanced Biostatistical Methods	SEP 2015 - DEC 2015
<ul style="list-style-type: none">• Conducted homework discussions with students weekly• Graded, provided correct homework solutions, provided office hours	

PRESENTATIONS

Invited Talk

School of Data Science, March 24, 2023, Charlottesville, VA

Study Brain Functional Connectivity Development In Adolescence Using Graphical Models

ENAR 2023, March 21, 2023, Nashville, TN.

A High-dimensional multi-exposure mediation model to unravel brain structure-functional interactions

ImgFun workshop at Colorado University Biostatistics, Virtual Presentation, Mar 16, 2023.

A Joint Directed Acyclic Graph Estimation Model to Detect Aberrant Brain Connectivity in Schizophrenia

Department of Statistics at University of Kentucky, Oct 28, 2022, Lexington, KY

A Joint Directed Acyclic Graph Estimation Model to Detect Aberrant Brain Connectivity in Schizophrenia

Department of Psychiatry at University of Pittsburgh, Virtual Presentation, Mar 17, 2021.

Study Brain Functional Connectivity Using Graphical Models

Department of Electrical and Computer Engineering at Rice University, Virtual Presentation, Jan 12, 2021.

Study Brain Functional Connectivity Using Graphical Models

Mental Health Data Science at Coulumbia University, Virtual Presentation, Jan 8, 2021.

Study Brain Functional Connectivity Development in Adolescence Using Graphical Models

Department of Biostatistics at Coulumbia University, Virtual Presentation, Dec 3, 2020.

A Latent Gaussian Copula Model for Data Integration and Its Application in Imaging Genetics

The Cole Neurocognition Lab at Rutgers University, Virtual Presentation, Nov 23, 2020.

Study Brain Functional Connectivity Using Graphical Models

Contributed Presentations

OHBM Annual Meeting, Virtual Presentation, Jun 6 - 7, 2022

Decoding Age-specific Changes in Brain Functional Connectivity Using a Sliding-window Based Clustering Method

9th Annual Tom R. Ten have Symposium on Statistics in Mental Health, Jun 3, 2022, New York, NY, USA.

New Advances in Statistics and Data Science, May 25, 2022, Honolulu, HI, USA.

A Sliding-window based Clustering Method to Decode Age-Specific Changes in Brain Functional Connectivity

Joint Statistical Meetings (JSM), Virtual Presentation, August 4th, 2020.

A Bayesian Incorporated Linear Non-Gaussian Acyclic Model (BiLiNGAM) for Multiple Directed Acyclic Graph Estimation with application to causal brain connectivity using fMRI (#313970)

OHBM Annual Meeting, Virtual Presentation, June 23 - July 3, 2020.

Causal functional brain network: An advanced approach to study brain cognitive variance (#1068)

SPIE Medical Imaging, Feb 17, 2020, Houston, TX, USA.

Estimation of a causal brain network in schizophrenia via a two-step Bayesian network analysis (#11318-40)

SPIE Medical Imaging, Feb 18, 2019, San Diego, CA, USA

Joint Gaussian copula model for mixed data with application to imaging epigenetics study of schizophrenia (#10954-26)

IEEE ISBI 2018, Apr 5, 2018, Washington, D.C., USA

High dimensional latent Gaussian copula model for mixed data in imaging genetics (#551)

SPIE Medical Imaging, Feb 14, 2018, Houston, TX, USA

Tracking the development of brain connectivity in adolescence through a fast Bayesian integrative method (#10579-20)

OHBM Annual Meeting, June 28, 2017, Vancouver, BC, CA.

Discovery of aberrant brain connectivity networks associated with Schizophrenia using a high-dimensional Gaussian Graphical Model (#4028)

Campus Presentations

School of Science and Engineering (SSE) Research Day, April 11, 2019

High Dimensional Latent Gaussian Copula Model for Mixed Data in Imaging Genetics

Tulane Health Sciences Research Days (HSRD), Feb 20-21, 2017

Discovery of Aberrant Brain Connectivity in Schizophrenia using Gaussian Graphical Models

SSE Research Day, April 6, 2017

Discovery of Aberrant Brain Connectivity in Schizophrenia using Gaussian Graphical Models

SERVICE TO PROFESSION

Editorial Coordinator of Technometrics, American Statistician Association (ASA).	2014 – 2015
Volunteer of K-12 STEM Education Outreach	2017 – 2021
Abstract Triage for the Neuromatch Conference	2020
Reviewer for Medical Image Analysis (MedIA)	
Reviewer for IEEE transactions on Medical Imaging (TMI)	
Reviewer for IEEE transactions on Network Science and Engineering (TNSE)	
Reviewer for IEEE transactions on Pattern Analysis and Machine Intelligence (PAMI)	
Reviewer for IEEE/ACM transactions on Computational Biology and Bioinformatics (TCBB)	

RESEARCH GRANT SUPPORT

Funded Projects at Columbia and NYSPI

1. NIH R01MH124106 (PI: Ying Liu) A Data Science Framework for Empirically Evaluating and Deriving Reproducible and Transferrable RDoC Constructs in Youth, \$3,351,397, 09/01/2020-06/30/2025, Role: Data Analyst
2. NIH R01AG062578 (PI: Seonjoo Lee) Statistical method for neural mechanism mediating and moderating cognitive system in Alzheimer's disease and aging research, \$2,086,831, 01/15/2020-12/31/2024, Role: Data Analyst

Funded Projects at Tulane

1. NIH R01MH121101, (PI: Tony Wilson) Developmental Multimodal Imaging of Neurocognitive Dynamics (Dev-MIND), 08/19/2019 – 05/31/2024, \$5,783,563, Role: Graduate Research Assistant
2. NIH R01GM109068 (PI: Yu-Ping Wang) Integration of multiscale genomic data for comprehensive analysis of complex disease, \$1,608,775, 09/17/2014 – 08/31/2019, Role: Graduate Research Assistant
3. NSF 1539067, (PI: Vince Calhoun) RII Track-2 FEC: Developmental Chronnecto-Genomics (Dev-CoG): A Next Generation Framework for Quantifying Brain Dynamics and Related Genetic Factors in Childhood, \$5,858,210.00, 08/01/2015-07/30/2019, Role: Graduate Research Assistant
4. NIH R01MH104680, (PI: Yu-Ping Wang) Integration of brain imaging with genomic and epigenomic data, \$2,071,571, 08/01/2014 - 07/31/2018, Role: Graduate Research Assistant

Submitted Grant as PI

1. **NIH Pathway to Independence Award (PA-20-188)**

NIH K99MH133984, Uncovering developmental connectomics deviation in obsessive-compulsive and anxiety disorders over child and adolescent leveraging multi-modal brain imaging, Status: Scientific Review Group review pending.

2. **NIH Director's Early Independence Awards (RFA-RM-21-018)**

NIH DP5OD033432, Integrating multimodal imaging and genetics to identify mechanistic pathways underlying children's neurocognitive development, Criteria Score: 35.

HONORS AND REWARDS

2021 Chinese Government Award for Outstanding Self-financed Students Abroad , China Scholar Council	2022
2021 Biomedical Engineering Graduate Student Outstanding Achievement Award , Tulane University	2021
GSSA Travel Award , Tulane University	2017 – 2020
Certificate of Outstanding Academic Achievement , University of Florida	2014 – 2015
Outstanding Student Scholarship , USTC	2011 – 2013
Outstanding Freshman Scholarship , USTC	2010

RELATED TRAINING

SHARP Traing Program: Skills for Health and Research Professionals	AUG 11-12, 2022
Organization: Columbia University Mailman School of Public Health	
Certification: Mendelian Randomization Boot Camp: A Practical Guide to Study Design and Implementation	
Woman in Neuroscience	JULY 8-10, 2019
Organization: Brown University, Dartmouth College, Montana State University and University of Nevada at Reno	
Content: Elevator Pitch Talk Training	
Deep Learning by deeplearning.ai	MARCH 22, 2019
Platform: Coursera	
Certification: Completion of five interconnected courses, which are <i>Neural Networks and Deep Learning</i> , <i>Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization</i> , <i>Structuring Machine Learning Projects</i> , <i>Convolutional Neural Networks</i> , and <i>Sequence Models</i> .	
Biostatistics Summer Institutes in Statistical Genetics (SISG) and Statistics in Big Data (SISBID)	JULY 11-29, 2016
Organization: University of Washington, Seattle	
Certification: Completion of <i>Quantitative Genetics</i> and <i>Supervised Methods for Statistical Machine Learning</i>	
CCNS: Computational Neuroscience Summer School	JULY 27-31, 2015
Organization: The Statistical and Applied Mathematical Sciences Institute (SAMSI)	
Content: Courses on five major research topics in computational neuroscience, including neural spike train analysis, compressed sensing for signal processing, functional data analysis for medical imaging data, big-biomedical data integration and analysis, shape analysis and diffeomorphisms for medical imaging data.	

MEMBERSHIP

Member of American Statistician Association (ASA).	2015 – PRESENT
Member of SPIE, the international society for optics and photonics	2018 – PRESENT

SKILLS

Languages C/C++, Fortran, Matlab, Python, R, SAS, SPSS, SQL, STATA	Tools Linux/Unix, L ^A T _E X
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