AISHWARYA H. BALWANI

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RESEARCH INTERESTS

Machine Learning, Digital Signal Processing, Applied Math & Computational Neuroscience

- Sparse, Low-Rank & Low-Dimensional Representations of Data
- Analysis of Artificial & Biological Neural Networks
- Transferability, Interpretability & Generalizability of Features in Deep Neural Networks
- Group & Representation Theory, Differential Geometry & Topology

EDUCATION

Georgia Institute of Technology

- PhD, Electrical & Computer Engineering, 2018-Present.
  Minor: Mathematics
- MS, Electrical & Computer Engineering, 2016-2018.

University of Mumbai

- BE, Electronics & Telecommunication, 2012-2016. (First Class with Distinction)

PUBLICATIONS, PREPRINTS & PEER REVIEWED ABSTRACTS

Publications

- Prasad, J., **Balwani, A.**, Johnson, E., Miano, J., Sampathkumar, V., De Andrade, V., ... & Dyer, E. "A three-dimensional thalamocortical dataset for characterizing brain heterogeneity." *Nature Scientific Data*, 2020.
- Liu, R., Subakan, C., **Balwani, A.**, Whitesell, J., Harris, J., Koyejo, S., & Dyer, E. "A generative modeling approach for interpreting population-level variability in brain structure." *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2020.
- **Balwani, A.**, & Dyer E. "Modeling variability in brain architecture with deep feature learning." *2019 53rd Asilomar Conference on Signals, Systems, and Computers. IEEE*, 2019.
- Milligan K., **Balwani A.**, Dyer E. "Brain Mapping at High Resolutions: Challenges and Opportunities." *Current Opinion in Biomedical Engineering*, 2019.
- Lee T., Kumar A., **Balwani A.**, Brittain D., Kinn S., Tovey C., Dyer E., da Costa N., Reid R., Forest C., & Bumbarger D. "Large-scale neuroanatomy using LASSO: Loop based Automated Serial Sectioning Operation." *PloS one*, 13.10, 2018.

Preprints

- **Balwani A.**, & Dyer E. "A Deep Feature Learning Approach for Mapping the Brain's Microarchitecture and Organization." *bioRxiv*, 2020.
- Miano J., **Balwani A.**, Liu R., Kitchell L., Prasad J., Johnson E., Gray-Roncal W., & Dyer E. "Multi-Scale Modeling and Segmentation of Neural Structure in Thalamocortical X-ray Imagery" submitted, *IEEE International Conference on Image Processing (ICIP)*, 2021.

In Preparation

- **Balwani A.**, Miano J., Liu R., Prasad J., Johnson E., Gray-Roncal W., & Dyer E. "Modeling Neural Structure Across Multiple Spatial Scales with Multi-Task Representation Learning."
- **Balwani A.**, & Dyer E. "Revealing Multi-Scale Latent Factors of Neural Structure using Representational Geometry."

Workshop Papers & Peer Reviewed Abstracts

- **Balwani A.**, & Dyer E. "Modeling Brain Microarchitecture with Deep Representation Learning." (Poster), *ML Interpretability for Scientific Discovery, ICML*, 2020.
- **Balwani A.**, Miano J., Prasad J., & Dyer E. "Learning to Segment at Multiple Scales." (Poster), *BioImage Informatics*, 2019.
- Milligan K., **Balwani A.**, Maguire A., Margulies S., & Dyer E. "Deep Learning for Characterization of Neuroinflammation in Traumatic Brain Injury." (Poster), *BioImage Informatics*, 2019.

RESEARCH & WORK EXPERIENCE

- Graduate Research Assistant, Georgia Institute of Technology (Summer 2018-Present)
  - Areas of Research: Representation learning, Transfer/Meta and Multi-task learning, Sparse and low-rank representations of data, Models of brain structure and organization.
- Graduate Student, Georgia Institute of Technology
  - Modeling visual invariance with group-theoretic regularization (Spring 2021)
  - Neural event recovery from noisy data via sparse deconvolution (Spring 2018)
  - Deep learning in autonomous driving (Fall 2017)
- R&D Intern (Algorithms Team), Intellifusion, China (Summer 2017)
  - Areas of Research: Image Processing, Digital Signal Processing, Machine Learning, Data Compression and Encryption.

TEACHING & MENTORING EXPERIENCE

Teaching Assistant

- Data Analytics for Engineers, Georgia Institute of Technology (Fall 2019, 2018)
- Hands-On Tech Day Camp, Georgia Institute of Technology (June 2019)
- Deep Learning for Microscopy Image Analysis, Marine Biological Laboratory (May 2019)
- Mathematical Foundations for Data Science, Georgia Institute of Technology (Spring 2018)

Junior Instructor

- Embedded Systems & IoT, Eduvance (Summer 2016)

HONOURS & AWARDS

Academic Awards & Fellowships

- ECE Coulter MS Fellowship, Georgia Institute of Technology, 2016-2017

Competitions & Hackathons

- Winner (Technical Track) – Hacklytics, Data Science at Georgia Tech, 2019
- Winner (Best Project) – AI/ML for Social Good Hackathon at Georgia Tech, 2018
- Gold Award - IEEE UBTech-Education Robotics Design Challenge, 2017

Registration & Travel Awards

- ICML Diversity and Inclusion Fellowship, 2020

PROFESSIONAL SERVICE

Reviewing

- Journals: Distill
- Workshops: Workshop on Geometrical and Topological Representation Learning (ICLR 2021), Topological Data Analysis and Beyond (NeurIPS 2020), Lifelong Learning Workshop (ICML 2020), Workshop on Continual Learning in Computer Vision (CVPR 2020)
- Other: Neuromatch Academy 2020, President's Undergraduate Research Awards – Georgia Tech (Spring 2020, 2021; Summer 2021; Fall 2020)

Professional & Student Organizations

- Senator (ECE), Graduate Student Association, Georgia Institute of Technology, 2017-2018

WORKSHOPS & SEMINARS

Attendee

- Banach Center – Oberwolfach Graduate Seminar: Mathematics of Deep Learning, Institute of Mathematics, Polish Academy of Sciences (November 2019)
- Foundation of Data Science Summer School, Georgia Institute of Technology (August 2019)
- Spinning Up in RL Workshop, OpenAI (February 2019)