AISHWARYA H. BALWANI

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RESEARCH INTERESTS

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

- Sparse & Low-Dimensional Representations of Data
- Analysis & Explainability of Biological Systems and Neural Networks
- Transferability, Interpretability & Generalizability of Features in Deep Neural Networks
- Generative Modelling

EDUCATION

Georgia Institute of Technology

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

University of Mumbai

- BE, Electronics and Telecommunication, 2012-2016.

HONOURS & AWARDS

- 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
- ECE Coulter MS Fellowship, 2016-2017

PUBLICATIONS & ABSTRACTS

Publications

- **Aishwarya Balwani**, Eva Dyer: Modeling Variability in Brain Architecture with Deep Feature Learning, IEEE Signal Processing Society Asilomar Conference on Signals, Systems, and Computers, November 2019.
- Kyle Milligan, **Aishwarya Balwani**, Eva Dyer: Brain Mapping at High Resolutions: Challenges, Opportunities, Current Opinion in Biomedical Engineering, 2019.
- T.J. Lee, A. Kumar, **A.H. Balwani**, D. Brittain, S. Kinn, C.A. Tovey, E.L. Dyer, N.M. da Costa, R.C. Reid, C.R. Forest, D.J. Bumbarger: Large-scale neuroanatomy using LASSO: Loop based Automated Serial Sectioning Operation, PLOS One 13 (10), e0206172.

Abstracts

- **Aishwarya Balwani**, Joseph Miano, Judy Prasad, Eva Dyer: Learning to Segment at Multiple Scales (Poster), BioImage Informatics, October 2019.
- K. Milligan, **A. Balwani**, A. Maguire, S. Margulies, E. Dyer: Deep Learning for Characterization of Neuroinflammation in Traumatic Brain Injury (Poster), BioImage Informatics, October 2019.

RESEARCH & WORK EXPERIENCE

- Graduate Research Assistant, Georgia Institute of Technology (May 2018-Present)
  - Neural Data Science Lab (Advisor: Dr. Eva Dyer)
  - **Projects**:

    1. Quantifying Within-Area Variability to Learn Inherent Structure in Brain Areas and ROI Identification: Leveraged deep learning to learn local microstructural distributions of different ROIs in the brain and segment them in X-ray micro-CT data. Applied similar ideas combined with transfer learning to successfully identify and segment brain areas in the Allen Institute's MCA auto-fluorescence data.

    2. Multi-Task Learning for Microscale Segmentation of Neuronal Components and Estimation of Brain Areas: Prototyped a deep convolutional neural network that concurrently segments structures of interest (e.g. cells, axons, blood vessels) in a sample image and estimates the ROI the sample is taken from.

    3. Sparse, Low Dimensional Signal Models for Explainable Complex Systems: Working on developing and using sparse, low dimensional signal models to understand information flow in both real and artificial neural networks.
- R&D Intern (Algorithms Team), Intellifusion, China (Summer 2017)
  - Areas of Research: Image Processing, Machine Learning, Data Compression and Encryption.
  - Developed a robust, non-blind digital watermarking scheme using wavelets, dimensionality reduction and encryption techniques to protect images against a variety of adversarial attacks.

TEACHING EXPERIENCE

Teaching Assistant

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

Junior Instructor

- Embedded Systems & IoT , Eduvance (Summer 2016)

SERVICE

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