Divya Shanmugam

divyas@mit.edu, dmshanmugam.github.io

Education

Massachusetts Institute of Technology   Expected 05/2023
  Ph.D, Electrical Engineering and Computer Science

Massachusetts Institute of Technology   05/2018
  Master of Engineering, Electrical Engineering and Computer Science
  Thesis title: *Representation Learning for Improved Distance and Risk Metrics*

Massachusetts Institute of Technology   05/2017
  B.S., Electrical Engineering and Computer Science

Experience

Research Intern, Fairness, Accountability, and Transparency Group, Montreal   06/2020 - 09/2020
    Learning to Limit Data Collection: Operationalizing the GDPR principle
    of data minimization—the responsibility to collect data ethically—in the context
    of machine learning.

Ph.D. Candidate, Clinical and Applied Machine Learning Group   09/2018 - present
    When & Why Test-Time Augmentation Works: Data augmentation is commonly used
    to increase performance for image classification networks. Why? We present the
    conditions conducive to test-time augmentation and provide an improved method.

    Multiple Instance Learning for ECG Risk Stratification: Existing risk metrics for
    cardiovascular death rely on hand-crafted features. We use multiple instance learning
    to identify features predictive of cardiovascular risk directly from an ECG signal.

Research Intern, Borealis AI   06/2018 - 09/2018
    Learning on Noisy Data: We developed a model to correct label noise in training data
    using an energy-based autoencoder.

Research Assistant, Clinical and Applied Machine Learning Group   07/2017 - 06/2018
    Metric Learning for Time Series: Applied machine learning towards improved
    distance and risk metrics for time series

    Dialect-based Disparities in NLP: Researched language diversity across economic
    class towards the development of dialect-agnostic representations for text

Research Intern, D.E. Shaw Research   06/2016 - 09/2016
> *Accelerating Graphical Rendering*: Restructured molecular dynamics graphics
> algorithm to enable 5x parallelism using quaternion representations.

Research Assistant, Computation and Biology Group   06/2016 - 09/2016
> *Fast Metagenomic Sequencing* Worked on methods to expedite metagenomic
> analysis by exploiting redundancy.

Publications ———————————————————————————————————————

* denotes equal contribution.

1. **D. Shanmugam**, D. Blalock, G. Balakrishnan, J. Guttag, "When and Why Test-Time Augmentation Works". *(under review)*
2. **D. Shanmugam**, S. Shabanian, F. Diaz, M. Finck, A. Biega "Learning to Limit Data for Data Minimization". *(under review)*
3. **D. Shanmugam**, D. Blalock, J. Guttag, "Multiple Instance Learning for ECG Risk Stratification". *MLHC-19* (oral presentation)
4. J. Sahota*, **D. Shanmugam***, J. Ramanan, S. Eghbali, M. Brubaker, "Addressing Feature-Dependent Label Noise: A Generative Framework" *(preprint)*
5. **D. Shanmugam**, D. Blalock, J. Guttag, "Jiffy: A Convolutional Approach to Multivariate Time Series Classification". *(preprint)*

Workshops and poster sessions ———————————————————————————

1. *Unsupervised Domain Adaptation in the Absence of Source Data*
   Uncertainty & Robustness in Deep Learning Workshop, ICML 2020
2. *Image Segmentation of Liver Stage Malaria Infection with Spatial Uncertainty Sampling*
   Workshop on Computational Biology, ICML 2019
3. *Multiple Instance Learning for Cardiac Risk Stratification.*
   Women in Machine Learning Workshop, NeurIPS 2018 (oral presentation)
4. *Multiple Instance Learning for ECG Risk Stratification.*
   Machine Learning for Health Workshop, NeurIPS 2018
5. *ECG Risk Stratification Using Multiple Instance Learning.*
   MIT DSAIL 2018
6. *Jiffy: A Convolutional Approach to Learning Time Series Similarity.*
   MIT MasterWorks 2018
7. *A Convolutional Approach to Learning Time Series Similarity.*
   Women in Machine Learning Workshop, NeurIPS 2017
8. *Identifying and Accounting for Disparities in Language Due to Economic Class.*
   Women in Machine Learning Workshop, NeurIPS 2017
9. *Compressive Metagenomics*
   MIT Microbiome Center Symposium 2016

Invited talks

1. *Multiple Instance Learning for ECG Risk Stratification.* University of Michigan in Ann Arbor, Michigan, August 2019

Professional Service

TEACHING

Teaching assistant: Introduction to Machine Learning, MIT	SPR 2018
Teaching assistant: Introduction to Machine Learning, MIT	FAL 2017

MENTORSHIP

Neha Hulkund, UROP	2020-now
Roshni Sahoo, SuperUROP	2018-2020
Skylar Gordon, AI Mentee	2018-2019
Xinyi Guo, AI Mentee	2018-2019

REVIEWING

NeurIPS	2020
Conference on Health, Inference, and Learning	2020
Machine Learning for Healthcare Conference	2020
Machine Learning for Health NeurIPS workshop	2019, 2020
Women in Machine Learning NeurIPS workshop	2018, 2020

PANELS

Graduate Student Panel (McCormick Hall)	2020
Graduate Student Panel (MIT Women in EECS)	2019
Lightning Talks (MIT Women in EECS)	2017

SERVICE

GW6 Event Coordinator	2018-2019
MIT AI Mentorship Program Coordinator	2018-2020

Awards

NSF Graduate Research Fellowship 2017

Languages

Programming: Python (tensorflow, keras, pytorch), Go, C
Spoken: English (Proficient), Spanish (Intermediate), Tamil (Beginner)