Roshni Sahoo

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Education

Massachusetts Institute of Technology 09/2016-06/2020
Candidate for B.S., Computer Science and Engineering.
Candidate for B.S., Mathematics.
GPA: 4.9/5.0.

Research

Research Assistant, Clinical and Applied Machine Learning Group 09/2019 - 12/2019

- Advised by Prof. John Guttag (MIT).
- Developing a method to adapt pre-trained classification models to changes in image statistics.
- Analyzed the effect of test-time augmentation on class-specific accuracies; current paper on practical utility of test-time augmentation under review.
- Investigated the impact of class-dependent label noise in the binary and multi-class classification setting; utilized label noise injection to diagnose pre-existing label noise rates.

Research Assistant, Distributed Robotics Lab 02/2018 - 12/2019

- Advised by Prof. Daniela Rus (MIT).
- Developed a deep-learning approach for measuring orientation uncertainty that outperforms the state of the art on challenging orientation and uncertainty estimation tasks; created visualizations for representing 3d orientations and uncertainties.
- Created a Bingham distribution-inspired loss function and optimized the computationally- expensive evaluation of this loss function by utilizing interpolation techniques.

Industry

Modeling Engineering Intern, Two Sigma Investments 06/2019 - 08/2019

- Evaluated different techniques for time-series learning on an equity factors dataset spanning 15 years in order to predict next day returns per financial instrument. Implemented tools for feature profiling, benchmarking the sensitivity of different models to hyperparameter tuning.
- Examined the interpretability of trained models using SHAP values, feature importance.

Software Engineering Intern, Cruise Automation 06/2018 - 08/2018

- Created modules for the 2D-Simulation Team to model autonomous vehicle driving. Developed tools to detect features from simulations based on ROS messages, handle action-scheduling.

Machine Learning Intern, Northrop Grumman 06/2017 - 08/2018

- Implemented algorithms using deep recurrent Q-networks and A3C for autonomous air vehicles to avoid radar detection and simultaneously track ground targets with Tensorflow.
- Created a simulation using Python to visualize the movements of the moving target and ground vehicle.

Publications

1. D. Shanmugam, D. Blalock, **R. Sahoo**, J. Guttag, "Towards Principled Test-Time Augmentation." Under review. Paper available here.
2. I. Gilitschenski, **R. Sahoo**, W. Schwarting, A. Amini, S. Karaman, D. Rus, "Deep Orientation Uncertainty Learning based on a Bingham Loss." ICLR 2020. Media for project available here.

Poster Sessions

(* denotes equal contribution.)

1. I. Gilitschenski, **R. Sahoo**, W. Schwarting, A. Amini, S. Karaman, D. Rus. *Deep Orientation Uncertainty Learning based on a Bingham Loss.* Women in Data Science Workshop, 2020.
2. **R. Sahoo**. *Developing Models Resilient to Label Noise.* Winter MIT SuperUROP Showcase, 2019.
3. V. Jain*, D. Medarametla*, **R. Sahoo***.*On Expected Running Sums and Stopping Times of Probability Distributions.* MAA Undergraduate Poster Session, Joint Mathematics Meetings, 2016.

Projects

1. *Leiserchess AI*: Collaborated with 3 other students to optimize a game-playing AI for a variant of chess. Reduced memory usage of the program using bithacks, simplified the logic of move generation and evaluation. Implemented jamboree search, created an opening book and stored it as a trie.
2. *MCMC Cipher-Breaking*: Implemented an efficient MCMC method to decrypt text encoded with a secret breakpoint-substitution cipher. Assessed tradeoffs between accuracy and performance.

Professional Service

Outreach

Computer Science Instructor, Beautiful Patterns, Aguascalientes, Mexico. 05/2019

- Mentored 25 students with no prior coding experience so that teams of students could create their own interactive websites by the end of the program.

Instructor, Global Teaching Labs, Barcelona, Spain. 01/2018 - 02/2018

- Developed one-month curriculums for subjects including physics, robotics, and computer science and taught high school students in the Escola Garbí.

Membership Development Chair, Society of Women Engineers (SWE). 09/2017 - 06/2018

- Organized monthly community events for female engineering students. Volunteered at weekly outreach STEM workshops. Represented MIT at SWE National Conference (2017), USASEF (2018).

Teaching

Teaching Assistant, Introduction to Deep Learning, MIT. 01/2020
Tutoring Chair, EECS Department, MIT 05/2019 - 05/2020
HKN Tutor, Fundamentals of Programming, Discrete Mathematics, MIT. 09/2018 - 06/2019
Lab Assistant, Elements of Software Construction, MIT. 02/2018 - 06/2018

Honors and Awards

NSF Graduate Research Fellowship Recipient	2020
Kelly-Douglas Traveling Fellowship Recipient	2019
Angle Research and Innovation Scholar	2019
IEEE Eta Kappa Nu (HKN) Honor Society	2019
MIT Burchard Scholar	2018
Massachusetts Academic Decathlon State Champion	2016
Outstanding Poster Award, MAA Undergraduate Poster Session, JMM	2016
Siemens Research Competition National Semifinalist	2015