Austin Xu

CONTACT INFORMATION

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https://austinxu87.github.io/

RESEARCH INTERESTS

Interested in preference learning, data representation learning, and causal explainability for black box algorithms. Broadly interested in studying human-machine teaming, reasoning from human query responses, and human decision making from an interpretable and mathematically grounded perspective.

EDUCATION

Georgia Institute of Technology, Atlanta, GA

Ph.D., Electrical and Computer Engineering — Aug. 2019 – Present
Concentration: Digital Signal Processing and Machine Learning — GPA: 4.0
Advisor: Dr. Mark Davenport
President's Fellow, ML@GT Fellow

University of Michigan, Ann Arbor, MI

B.S.E, Electrical Engineering, Summa Cum Laude — Sept. 2015 – May 2019
Concentration: Digital Signal Processing — GPA: 3.98

CONFERENCE PUBLICATIONS

[C2] N. Nadagouda, **A. Xu**, and M. A. Davenport, "Active Selection of Nearest Neighbor Queries for Learning Embeddings." *Submitted to NeurIPS 2021*, June 2020.

[C1] **A. Xu** and M. A. Davenport, "Simultaneous Preference and Metric Learning from Paired Comparisons." *Proc. Conf. on Neural Information Processing Systems (NeurIPS)*, Online, December 2020. **Selected for Spotlight Presentation (4%)**

WORKSHOPS

Gene Golub SIAM Summer School — July 2021
African Institute for Mathematical Sciences (AIMS) | *Muizenberg, South Africa*

- Selected as one of 30 global participants for the "Theory and Practice of Deep Learning" summer school. Postponed to July 2021 due to COVID-19 pandemic.

RESEARCH EXPERIENCE

Georgia Institute of Technology, Atlanta, GA
Advisor: Mark Davenport — **Aug. 2019 – Present**

- Investigating novel querying methods for spatial-dependent metric learning. [Python].
- Developed novel joint ideal point and Mahalanobis metric estimation algorithm from paired comparisons. [Matlab].
- Utilized information-theoretic criterion for adaptive selection of a novel nearest neighbor query. Applied adaptive selection scheme for active learning and similarity embedding learning. [Python].

University of Michigan, Ann Arbor, MI
Advisor: Laura Balzano — **Sept. 2018 – Aug. 2019**

- Characterized effects parameter tuning for the order-weighted L1 (OWL) norm for promoting group sparsity. Results handed off for learning sparse Bradley-Terry judgment weights from paired comparison data. [Python].
- Developed algorithm to perform blind sensor calibration for data drawn from time-varying low-rank subspaces. Alternated sensor gain learning via Total Least Squares and subspace estimation via GROUSE. Achieved $< 5\%$ sensor calibration error with good initialization. [Matlab].
- Formulated additive union of subspaces sensor model and blindly estimated sensor gains via orthogonal projection. [Matlab].

Advisor: David Wentzloff — **Jan. 2017 – April 2018**

- Automated post-processing and data visualization of received MURS band wireless communication data. Enabled mobile wireless testing without the need to transport laboratory equipment. [Python].

- Characterized supercapacitors discharge rate and response to various current loads (pulsed vs. DC) to assess viability for use as power source for ultra low power wireless sensors. Automated data collection and visualization. [NI LabVIEW].

Advisor: Zhengya Zhang **Aug. 2017 – Dec 2017**

- Conducted literature review of deep learning architectures for semantic image segmentation.
- Automated test process for wireless communication ICs. Interfaced with Salae Digital Logic Analyzer to sample and decode received data. [Python, Matlab].

Advisor: Mark Hammig **Oct 2016 – April 2017**

- Immunized analog radiation detection preamplifier to input detector capacitance, resulting in nearly constant gain and rise time. [OrCAD PSpice]
- Interfaced scintillator and silicon photomultiplier (SiPM) test setup to collect and plot positions of radiation concentration from various emission sources. [Matlab].
- Awarded "Outstanding Research Presentation" award at the annual Undergraduate Research Opportunity Program (UROP) symposium. Selected as one of 100 awardees from a pool of 1000+ undergraduate participants.

Industry Experience

Sandia National Laboratories May 2018 - Aug. 2018

Undergraduate R&D Intern, Flight and Instrumentation Systems Group Albuquerque, NM

- Developed features for GUI that communicates to FPGA and imaging array via SpaceWire/RMAP. Implemented modular design that incorporated hardware specific communication and file parsing. Optimized testing workflow for hardware changes, which enabled rapid future hardware prototyping. [C++, Qt Creator].
- Implemented internal image processing algorithm. Quantified algorithm accuracy under fixed point and floating point datatypes to determine hardware implementation viability. [Matlab].

General Motors May 2017 - Aug. 2017

Student Intern, Automated Driving and Active Safety Group Warren, MI

- Collaborated with GM and tier 1 supplier to develop and implement supply-chain-wide thermal validation plan for rear view camera coaxial cable. Validation plan was adopted for rear view cameras in all future GM vehicles.
- Utilized internal software to de-warp rear view camera images to meet internal and government guidelines. Discovered discrepancy between test vehicle de-warping output and specifications, resulting in re-calibrated software update.

Teaching Experience

Graduate Teaching Assistant Aug. 2019 - Aug. 2020

Professional and Technical Communications (ECE 3005) | *Georgia Institute of Technology*

- Held individual consultations with 20+ undergraduate students to develop their technical communication skills. Provided constructive feedback on resumes, technical documents, and presentations.
- Interfaced with students during 15 hours of weekly office hours, graded assignments, and assisted with in-class activities.

Instructional Aide Sept. 2018 - May 2019

Discrete Mathematics (EECS 203) | *University of Michigan*

- Interacted with groups of 20+ undergraduate students during weekly recitation section and office hours. Effectively answered questions, explained concepts, and solved guided practice problems. Achieved an instructor evaluation of 4.7/5.0.
- Managed group of 16 graders. Created weekly grading assignments and rubrics, proofread homework solutions, and enforced grading timeline.
- Created homework and exam problems in collaboration with 18 other staff members. Half of individually created exam problems were used on exams, which was highest rate among IAs.

AWARDS

Machine Learning at Georgia Tech Fellow | Georgia Institute of Technology — May 2021
President's Fellowship | Georgia Institute of Technology — Aug. 2019
Distinguished Academic Achievement Award | University of Michigan — Mar. 2019
Outstanding Service Award, EECS Dept. | University of Michigan — Feb. 2018
EECS Scholar | University of Michigan — Feb. 2018
Eta Kappa Nu Scholarship | University of Michigan — April 2017
UROP Outstanding Research Presentation Award | University of Michigan — Mar. 2017
James B. Angell Scholar | University of Michigan — Mar. 2017
William J. Branstrom Freshman Prize | University of Michigan — Mar. 2016
Dean's List/University Honors | University of Michigan — All Semesters

SERVICE

Undergraduate Engineering Student Advisory Board (UESAB) — Sept. 2018 - May 2019
Electrical Engineering Representative | University of Michigan

Eta Kappa Nu - Beta Epsilon Chapter — Sept. 2018 - Dec. 2018
Officer - Historian | University of Michigan

ECE Undergraduate Advising Office — Sept. 2017 - Dec. 2018
Peer Advisor | University of Michigan

STEM Society — Sept. 2017 - Dec 2018
Laboratory Leader | University of Michigan

Eta Kappa Nu - Beta Epsilon Chapter — Jan. 2018 - May 2018
Tutoring Chair | University of Michigan