

Austin Xu

CONTACT INFORMATION	Phone: (248) 402-3571 Email: axu77@gatech.edu	https://austinxu87.github.io/
RESEARCH INTERESTS	Interested in human preference learning, ranking systems, learning from non-metric queries, and representation/embedding/contrastive learning. Additional interests include explainable and fair machine learning.	
EDUCATION	Georgia Institute of Technology , Atlanta, GA <i>Ph.D., Electrical and Computer Engineering</i> 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 <i>B.S.E., Electrical Engineering</i> , Summa Cum Laude Sept. 2015 – May 2019 Concentration: Digital Signal Processing GPA: 3.98	
CONFERENCE PUBLICATIONS	[C3] N. Nadagouda, A. Xu , and M. A. Davenport, "Active metric learning and classification using similarity queries." <i>Under review</i> , January 2022. [C2] A. McRae, A. Xu , J. Jin, N. Nadagouda, N. Ahad, P. Guan, S. Karnik, M. A. Davenport, "Delta distancing: A lifting approach to localizing items from user comparisons.", to appear in <i>Proc. IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)</i> , May 2022. [C1] A. Xu and M. A. Davenport, "Simultaneous Preference and Metric Learning from Paired Comparisons.", in <i>Proc. Conf. on Neural Information Processing Systems (NeurIPS)</i> , Online, December 2020. Selected for Spotlight Presentation (4%)	
JOURNAL PUBLICATIONS	[J1] A. Xu , A. Pananjady, M. A. Davenport, "Human perception metric learning from parametric adjustment queries." <i>In Preparation</i> .	
PRESENTATIONS	"Simultaneous Preference and Metric Learning from Paired Comparisons," Spotlight Presentation at 2020 Conference on Neural Information Processing Systems (NeurIPS) <i>Virtual</i>	
WORKSHOPS	Gene Golub SIAM Summer School : "Theory and Practice of Deep Learning" July 2021 African Institute for Mathematical Sciences (AIMS) <i>Muizenberg, South Africa</i>	
RESEARCH EXPERIENCE	Georgia Institute of Technology , Atlanta, GA Advisor : Mark Davenport Aug. 2019 – Present <ul style="list-style-type: none">Investigating robust metric learning under arbitrary human noise models using low-rank matrix sensing techniques.Developed novel joint ideal point and Mahalanobis metric estimation algorithm from paired comparisons. First work in ideal point localization to consider non-Euclidean distances to quantify preferences, allowing for weighted feature interactions. Algorithm generated interpretable learned metrics and ideal points for real-world paired comparison preference data.Developed information-theoretic criterion for adaptive selection of a novel nearest neighbor query. Query responses directly improve learned embeddings, allowing for out-of-box application of adaptive query selection to both active deep metric learning (DML) and active classification. Implemented DML experiments which outperformed recent active DML approaches on multiple real-world datasets. University of Michigan , Ann Arbor, MI Advisor : Laura Balzano Sept. 2018 – Aug. 2019	

- Investigated use of order-weighted L1 (OWL) norm for determining relevant features for learning human preferences from paired comparisons. Characterized effects parameter tuning for OWL norm for promoting group sparsity.
- 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.
- Formulated additive union of subspaces sensor model and blindly estimated sensor gains via orthogonal projection.

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
	<i>Electrical Engineering Representative</i> University of Michigan	
	Eta Kappa Nu - Beta Epsilon Chapter	Sept. 2018 - Dec. 2018
	<i>Officer - Historian</i> University of Michigan	
	ECE Undergraduate Advising Office	Sept. 2017 - Dec. 2018
	<i>Peer Advisor</i> University of Michigan	
	STEM Society	Sept. 2017 - Dec 2018
	<i>Laboratory Leader</i> University of Michigan	
	Eta Kappa Nu - Beta Epsilon Chapter	Jan. 2018 - May 2018
	<i>Tutoring Chair</i> University of Michigan	