James Smith

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RESEARCH FOCUS

I want to build vision systems which learn from data that is from multiple sources and distributions, while protecting data privacy concerns. To work towards this goal, I look at problems such as: **lifelong/continual learning**, **knowledge distillation**, **federated learning**, and **low-label classification**.

EDUCATION

PhD in Machine Learning, Georgia Institute of Technology (current)
Advisor: *Dr. Zsolt Kira*
Enrolled: August 2018 | Expected Graduation Date: May 2023

Master of Science in Electrical Engineering, Auburn University (May 2018)
Advisor: *Dr. Bogdan Wilamowski*

Bachelor of Electrical Engineering, Auburn University (May 2017)
Minors in Computer Science, Political Science

PUBLICATIONS

[1] **James Smith**, Yen-Chang Hsu, Jonathan Balloch, Yilin Shen, Hongxia Jin, Zsolt Kira. "Always Be Dreaming: A New Approach for Data-Free Class-Incremental Learning", International Conference on Computer Vision (ICCV), 2021. **(25.9% acceptance rate)** [Paper] [Code]

[2] **James Smith**, Cameron Taylor, Seth Baer, Constantine Dovrolis. "Unsupervised Progressive Learning and the STAM Architecture", *International Joint Conference on Artificial Intelligent (IJCAI)*, 2021. **(13.9% acceptance rate)** [Paper] [Code]

[3] **James Smith**, Yen-Chang Hsu, Jonathan Balloch, Zsolt Kira. "Memory-Efficient Semi-Supervised Continual Learning: The World is its Own Replay Buffer", *International Joint Conference on Neural Networks (IJCNN)*, 2021. [Paper] [Code]

[4] **James Smith**, Bo Wu, Bogdan Wilamowski. "Neural Network Training with Levenberg–Marquardt and Adaptable Weight Compression", *IEEE Transactions on Neural Networks and Learning Systems*, 30(2), 580-587, 2019. [Paper]

[5] **James Smith**, Michael Baginski. **"**Thin-Wire Antenna Design Using a Novel Branching Scheme and Genetic Algorithm Optimization", *IEEE Transactions on Antennas and Propagation*, 67(5), 2934-2941, 2019. [Paper]

[6] Bo Wu, **James Smith**, Bogdan Wilamowski, Mark Nelms. "DCMDS: Density-Concentrated Multi-Dimensional Scaling Algorithm for Data Visualization", *Journal of Visualization*, 22, 341-357, 2019. [Paper]

[7] **James Smith**, Bogdan Wilamowski. "Discrete Cosine Transform Spectral Pooling Layers for Convolutional Neural Networks", *International Conference on Artificial Intelligence and Soft Computing (ICAISC)*, Zakopane, Poland, 2018. [Paper]

WORKSHOPS

[8] **James Smith**, Seth Baer, Cameron Taylor, Constantine Dovrolis. "Unsupervised Progressive Learning and the STAM Architecture", *Lifelong Learning Workshop at ICML*, 2020.

[9] **James Smith**, Seth Baer, Zsolt Kira, Constantine Dovrolis. "Unsupervised Continual Learning and Self-Taught Associate Memory Hierarchies", *LLD Workshop at ICLR*, 2019.

RELEVANT EXPERIENCE

Georgia Tech Atlanta, GA — Since August 2018
Graduate Research Assistant, College of Computing

SRI International Princeton, NJ (virtual from Atlanta) — May 2021 – August 2021
Computer Vision Research Intern, PhD

Radiance Technologies Huntsville, AL — May 2018 – August 2018
Machine Learning Intern

Auburn University Auburn, AL — May 2017 – May 2018
Graduate Research Assistant, Department of Electrical and Computer Engineering

Auburn University Auburn, AL — July 2016 – May 2017
Undergraduate Research Fellow

Naval Research Laboratories Washington, DC — May 2015 – August 2015
Research Intern

SELECTED PROJECTS

Data-Free Class-Incremental Learning [1]

- We contribute a novel incremental distillation strategy which does not store training data, achieving state-of-the-art performance on data-free class-incremental learning benchmarks
- Impact: reduce memory budget and eliminate private data storage for incremental learning applications (healthcare, autonomous vehicles, etc.)

Unsupervised Progressive Learning [2,8,9]

- We formalize the Unsupervised Progressive Learning (UPL) setting: learning representations for downstream tasks (such as classification) from a non-stationary stream of unlabeled data in which the number of object classes increases with time
- We contribute a neuro-inspired architecture for UPL which involves an online clustering modules, called Self-Taught Associative Memory (STAM)
- Impact: enable fast and efficient low-label streaming applications such as facial recognition

Semi-Supervised Continual Learning []

- We formalize the realistic Semi-Supervised Continual Learning (SSCL) setting, where data distributions reflect object class correlations between, and among, the labeled and unlabeled data distributions
- We contribute a novel learning approach that works within this realistic, memory-constrained continual learning setting, DistillMatch, notably outperforming closest prior art
- Impact: enable SSCL for on-device learning that is robust to several realistic data SSCL distributions

HONORS

- NSF Graduate Research Fellowship Program Honorable Mention – 2018
- Alton B. Zerby and Carl T. Koerner National Outstanding Electrical and Computer Engineering Student Award, L.A. Alumni Chapter IEEE/HKN – 2017 **(one of two nationwide recipients)**
- President's Award, Samuel Ginn College of Engineering – 2017 **(single recipient)**
- ECE Outstanding Student of the Year, Auburn University – 2017 **(single recipient)**
- Auburn University Nominee for Rhodes and Marshall Scholarships – 2016

OTHER

- Co-organizer of Georgia Tech ML PhD Student Seminar Series (Since August 2020)