CONNOR H. MCCURLEY

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RESEARCH INTERESTS

My research focus is in developing machine learning approaches for remote sensing applications. Specifically, I look into approaches for dimensionality reduction and manifold estimation which learn from weak and imprecise groundtruth. Other areas of interest include: multi-resolution sensor fusion, target detection, metric embedding, semantic segmentation and multiple instance learning.

EDUCATION

Ph.D. Candidate in Electrical & Computer Engineering   **Expected August 2022**

University of Florida, Gainesville, FL

- Concentration in **Machine Learning**
- Dissertation: "Discriminative Manifold Embedding with Imprecise, Uncertain and Ambiguous Data"
- Faculty Advisor: Dr. Alina Zare
- Dissertation Committee: Dr. Paul Gader, Dr. Jose Principe, Dr. Joseph Wilson

B.S. in Electrical Engineering   May 2017

Oklahoma State University, Stillwater, OK   **Cum Laude**

- Concentration in Communications, Controls, and Signal Processing
- Minor in Mathematics

RESEARCH EXPERIENCE

Graduate Research Assistant | University of Florida   Aug 2017 – Present

Discriminative Manifold Embedding with Imprecise, Uncertain and Ambiguous Data

- Explored methods in deep learning for weakly-supervised semantic segmentation
- Developed approaches for model understanding and fusion using weakly-labeled groundtruth
- Compared developments to state-of-the-art techniques
- Applied developments to a variety of remotely-sensed data, including infrared, visual spectrum, RGB, hyperspectral and sonar imagery

Superpixel Segmentation and Texture Feature Learning for Multi-Aspect Underwater Scene Understanding (ONR)

- Worked with multiple universities and Office of Naval Research (ONR) officials to achieve research objectives
- Developed machine learning algorithms for underwater scene understanding using SONAR
- Investigated approaches for semantic segmentation and multi-scale feature learning using weakly-labeled groundtruth

Aided Target Recognition using Imprecise and Uncertain Data (ARO)

- Collaborated with multiple universities and companies to achieve research objectives
- Developed machine learning methods for target detection in infrared and visual spectrum imagery
- Investigated approaches for target detection and semantic segmentation using weakly-labeled groundtruth
- Coded machine learning algorithms in Python and PyTorch
- Provided code and results deliverables on-time
- Communicated effectively with experienced researchers and U.S. Army representatives

Multi-sensor Fusion for Buried Object Detection (ARO)

- Performed experimental and theoretical studies in explosive hazard detection
- Worked to develop algorithms employed on US Army hand-held metal detectors
- Developed approaches for soil interference removal and target detection using weakly-labeled groundtruth
- Coded machine learning algorithms in Matlab and Python
- Ran experiments to compare machine learning approaches
- Communicated effectively with experienced researchers and U.S. Army representatives

Teaching & Mentoring

Graduate Mentor
University of Florida
Aug 2020 – Present
Gainesville, FL

- Led and directed 7 undergraduate and 1 M.S. student on research project
- Contributed to students' understanding of the academic research process
- Guided students in data annotation, coding of machine learning algorithms, experimental design and result dissemination

Supervised Teaching - EEL 4930 Fundamentals of Machine Learning
University of Florida
Jan 2019 – May 2019
Gainesville, FL

- Assisted in teaching over 25 students in undergraduate-level machine learning course
- Provided multiple lectures on normalization techniques, Random Forests, Kernels and Support Vector Machines
- Led test review sessions and provided weekly office hours

Supervised Teaching - EEL 5840 Fundamentals of Machine Learning
University of Florida
Aug 2018 – Dec 2018
Gainesville, FL

- Assisted in teaching over **180 students in graduate-level machine learning course**
- Provided three lectures on Linear Discriminant Analysis and backpropagation in artificial neural networks
- Wrote custom Python scripts to aid with grading homework and tests
- Managed git repository for class assignment submissions

GatorTRAX Volunteer
University of Florida
Jan 2018 – May 2019
Gainesville, FL

- Weekly youth mentor promoting STEM participation and outreach
- Gave fun and interactive presentations on "How Machines Learn"
- Led group activities such as making bracelets spelling words in binary code.

Vice President of Scholarship
Sigma Phi Epsilon Fraternity
May 2014 – Dec 2014
Rolla, MO

- Developed and implemented Sigma Accelerator Academic Program
- Created 12 practices tests in Calculus I, Calculus II, Trigonometry, College Algebra, and Chemistry
- Led practice tests, reviews, and tutoring sessions for new members
- Guided fraternity to place first in grades among 22 fraternities and sororities
- Contributed to winning the highest award from Sigma Phi Epsilon Nationals

Professional Development

Engineering Faculty Development Course (EGN 6933)
University of Florida
Jan 2021 – Apr 2021

- Semester-long course focusing on exploration and experiential preparation for careers in academia.

Grant Writing Experience
University of Florida
Oct 2019 – Jan 2020

- "Right hand man" to PI on proposal for multi-million dollar National Science Foundation AI Institute, (Unfortunately, not funded)
- Managed communications among over 30 faculty members and company representatives in fundamental artificial intelligence, agroecosystem ecology, and economics
- Developed content for broader impacts of institute contributions

Engineering Fellowship Preparation Course (EGN 6937)
University of Florida
Aug 2018 – Dec 2018

- Semester-long course over development in understanding of the fellowship and grant writing process.

Awards, Fellowships, and Grants

Grand Total: $218, 130

Wilson and Marie Collins Endowment for Graduate Fellowship |$130, 878   Fall 2019
Merit based scholarship to support graduate studies at the University of Florida

Graduate Student of the Week |$0   Fall 2018
Recognition by University of Florida for academic achievements

Graduate School Preeminence Award |$87, 252   Fall 2017
Merit based scholarship to support graduate studies at the University of Florida

Publications

Published

- J. Peeples, S. Walker, **C. H. McCurley**, A. Zare, J. Keller, and W. Xu. **"Divergence Regulated Encoder Network for Joint Dimensionality Reduction and Classification,"** in *IEEE Geoscience and Remote Sensing Letters (GRSL)*, vol. 19, pp. 1-5, 2022.

- J. Peeples, **C. H. McCurley**, S. Walker, D. Stewart, and A. Zare. **"Learnable Adaptive Cosine Estimator (LACE) for Image Classification,"** in *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, pp. 3479-3489, 2022.

- S. K. Meerdink, J. Bocinsky, A. Zare, N. Kroeger, **C. H. McCurley**, D. Shats and P. D. Gader. **"Multi-Target Multiple Instance Learning for Hyperspectral Target Detection,"** in *IEEE Transactions on Geoscience and Remote Sensing (TGRS)*, 2021.

- S. Meerdink, J. Bocinsky, E. Wetherley, A. Zare, **C. H. McCurley**, and P. Gader. **"Developing spectral libraries using Multiple Target Multiple Instance Adaptive Cosine/Coherence Estimator,"** *10th Workshop on Hyperspectral Imaging and Signal Processing: Evolution in Remote Sensing (WHISPERS)*, pp. 1-5, Sept. 2019.

- **C. H. McCurley**, J. Bocinsky, A. Zare. **"Comparison of Hand-held WEMI Target Detection Algorithms,"** in *Proc. SPIE 11012, Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XXIV*, 2019.

- J. Bocinsky, **C. H. McCurley**, D. Shats and A. Zare. **"Investigation of Initialization Strategies for the Multiple Instance Adaptive Cosine Estimator,"** in *Proc. SPIE 11012, Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XXIV*, 2019.

Under Review or Accepted

- **C. H. McCurley**, D. Rodriguez, C. Trousdale, A. Stevens, A. Baldino, E. Li, I. Perlmutter, and A. Zare. **"Bag-level Classification Network for Infrared Target Detection,"** in *Proc. SPIE, Automatic Target Recognition XXXII*, 2022. (Accepted.)

- S. Zou, **C. H. McCurley**, A. Zare and P. Gader. **"A Review of Learning from Weak and Imprecise Labels."** (Under Review.)

Conferences and Presentations

Oral Presentations

- **C. H. McCurley**, J. Bocinsky, and A. Zare. **"Comparison of Hand-held WEMI Target Detection Algorithms,"** *International Society for Optics and Photonics (SPIE) Defense + Commercial Sensing Conference*, Baltimore, MD, April 2019.

- **C. H. McCurley**. **"Student of the Week: Machine Learning and Sensing Lab,"** ECE GSO General Body Meeting, University of Florida, October 2018.

- **C. H. McCurley**, J. Bocinsky, and A. Zare. **"Electromagnetic Induction (EMI) Analysis,"** Institute for Defense Analyses (IDA), Alexandria, VA, August 2018.

Poster Presentations

- S. Zou, **C. H. McCurley**, A. Zare, C. Jiao, S. Meerdink, J. Bocinsky, N. Kroeger and P. Gader. **"Target Detection Given Uncertain Training Data,"** *Warren B. Nelms Annual IoT Conference*, Gainesville, FL, Dec. 2019.

INDUSTRY EXPERIENCE

System Protection and Controls Engineering Intern
Oklahoma Gas & Electric

May 2016 – Aug 2016
Oklahoma City, OK

- Completed over 20 System Protection designs to be implemented in the field
- Experience with protective relaying, breakers, load tap changers, integrated volt-VAR controllers, and other power circuit protection technologies
- Responsible for interpreting and drafting CAD drawings of protection and control schematics
- Aided in design and calculations regarding solar shading, inverters, panels, layout, and land selection for 25 MW solar farm

Distribution Engineering Intern
Oklahoma Gas & Electric

May 2015 – Aug 2015
Oklahoma City, OK

- Completed over 15 distribution designs totaling $690,000
- Gathered on-site measurements which were used to supply recommended designs
- Determined distribution designs based on cost, reliability, and maintainability
- Utilized communication and teamwork skills when collaborating with fellow employees

COMPUTER SKILLS

Languages: Python, PyTorch, Matlab
Software: Git, Jupyter Notebooks
Systems: Windows, Mac OS, Linux

REFERENCES

Alina Zare, Prof. of Electrical & Computer Eng.
Ph.D. Advisor | University of Florida, Gainesville, FL | 352-273-2604 | azare@ece.ufl.edu

Marie Talbott, Electronics Engineer at U.S. DEVCOM C5ISR Algo. and Image Proc. Branch, Countermine Div.
Program Manager | Ft. Belvoir, Ft. Belvoir, VA | 703-704-0011 | marie.e.talbott.civ@mail.mil

Bryan Hawk, Director of Instructional Services
Teacher | Canadian Valley Technology Center, El Reno, OK | 405-226-8755 | bhawk@cvtech.edu