ANDREA BURNS

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EDUCATION

PhD   Boston University, Computer Science   2018 - Present
           Advisors: Prof. Kate Saenko, Prof. Bryan A. Plummer
           Research Group: Image and Video Computing

BS   Tulane University, Computer Science, Mathematics   2014 - 2018
           GPA: 3.94/4.0, Summa Cum Laude
           Minor: French, Member of Phi Beta Kappa honor society and Women in Technology

-   Université Paris Diderot   2016
           French immersion semester abroad

PUBLICATIONS

[1]   **A. Burns**, A. Sarna, D. Krishnan, A. Maschinot. "Unsupervised Disentanglement without Autoencoding: Pitfalls and Future Directions." Self-Supervised Learning for Reasoning and Perception (SSL) Workshop at International Conference on Machine Learning (ICML), 2021.

[2]   **A. Burns**, D. Arsan, S. Agrawal, R. Kumar, K. Saenko, B. A. Plummer. "Mobile App Tasks with Iterative Feedback (MoTIF): Addressing Task Feasibility in Interactive Visual Environments." Visually Grounded Interaction and Language (ViGIL) Workshop at North American Association for Computational Linguistics (NAACL), 2021. (Spotlight, top 11% of papers)

[3]   **A. Burns**, D. Kim, D. Wijaya, K. Saenko, B. A. Plummer. "Learning to Scale Multilingual Representations for Vision-Language Tasks." In the European Conference on Computer Vision (ECCV), 2020. (Spotlight, top 5% of papers)

[4]   **A. Burns**, R. Tan, K. Saenko, S. Sclaroff, B. A. Plummer. "Language Features Matter: Effective Language Representations for Vision Language Tasks." In the Proceedings of the IEEE International Conference on Computer Vision (ICCV), 2019.

[5]   **A. Burns**, W.U. Bajwa. "Multispectral imaging for improved liquid classification in security sensor systems." In the Proceedings of the International Society of Optics and Photonics (SPIE) 10644, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIV, 2018.

HONORS AND AWARDS

Google Ph.D. Fellowship   2021

Third Place Winner, CVPR VizWiz Grand Challenge	2020
Grace Hopper Conference Award, Boston University	2019
Invited participant for the Grad Cohort Workshop, CRA-W	2019
Dean's Fellowship, Boston University	2018
Friezo Family Greater New York Area Scholarship, Tulane University	2015 - 2018
The Elsa Freiman Angrist Scholarship, Tulane University	2015 - 2018
Dean's List, Tulane University	2014 - 2018
The Academic Achievement Award Scholarship, Tulane University	2014 - 2018

RESEARCH

Tulane University, New Orleans, LA   2017 - 2018
Undergraduate Researcher, Probabilistic Chemotaxis Modeling for Sperm Motility
- Developed a probabilistic algorithm to determine sperm swimming behavior with chemotaxis and short-term swimming decisions in Python.
- Presented at the SCALA conference at Louisiana State University, February 2018.

DIMACS, New Brunswick, NJ   2017
NSF REU Scholar, Multispectral Liquid Classification
- Improved accuracy of image classification of liquids by 60% using a self-curated multispectral dataset in Python.
- "Multispectral imaging for improved liquid classification in security sensor systems" published and presented at the SPIE Defense & Security Conference, April 2018

Tulane University, New Orleans, LA   2016
NSF REU Scholar, Mathematical and Computational Biofluids
- Discovered implicit limitations in phenomenological and neural-based models of simple vertebrate locomotion when affected by external sensory input. A mixture of models was applied using MATLAB.

INDUSTRY

Google, Cambridge, MA   2021
Research Intern, Student Researcher, Robust Perception
- Analyzed existing vision-language representations in state-of-the-art models to understand what is learned with contrastive learning approaches.

Google, Cambridge, MA   2020-2021
Research Intern, Student Researcher, Robust Perception
- Designed and implemented three methods for disentangled visual representations using unsupervised contrastive learning techniques in TensorFlow.
- Ran experiments with all proposed regularization or loss terms and analyzed the trade-offs across downstream performance, optimization, and degree of disentanglement.

Ellevest, New York, NY   2018
Software Engineering Intern, Drift Report Update and Extension

- Implemented key compliance report to ensure consistency between clients' assigned portfolios and owned securities.
- Refactored SQL to query relevant account information and integrated Sidekiq job into Ruby on Rails application to store in database records.
- Implemented front-end interface for filtering, analyzing, and taking action on accounts with inconsistencies.
- Began work on creating intelligent models for action prediction.

TEACHING

Guest Lecturer – Machine Learning (CS542)
Boston University, Spring 2021
Introduced the field of vision and language with an overview of common vision-language tasks and learning objectives, representation learning approaches, and relevant metrics.

Guest Lecturer – AI & Systems Biology (ENGBE500)
Boston University, Spring 2020
Introduced the fundamentals of feed-forward and convolutional neural networks.

Grader– Machine Learning (CS542)
Boston University, Fall 2019
Graded multiple assignments during the semester, reviewed content and oversaw Piazza discussions.

Teaching Fellow – Introduction to Computer Science (CS101)
Boston University, Spring 2021
Taught and facilitated lab lectures and held weekly office hours on introductory computer science concepts and programming skills.

PROJECTS

Boston University
Graduate Researcher, 2019 – Present

- Automating Web Tasks Across Environment and Ability. Building mobile app task dataset, to be used for the purpose of automating web navigation tasks across different environments. A feasibility classifier and action-oriented captioning model will be built to provide tools for low vision or blind users.

Graduate Researcher, 2020

- Image Captioning for Pictures Taken by Low-Vision and Blind Users. Designing image captioning models that better leverage spatial relationships and well-known patterns/logos to counter OCR failures. Third place winner of the VizWiz Grand Challenge at CVPR 2020, awarded $10K Microsoft Azure Credit.

Graduate Student, 2019
- Programming Languages (CS520) Final Project. Implemented logistic regression and perceptron algorithms by creating abstract supervised learning templates in ATS. Informational video can be found here: www.youtube.com/watch?v=YRNSqJDEcws.

Graduate Student, 2018
- Image and Video Computing (CS585) Final Project. Surveyed feature representations for Visual Speech on the AVLetters dataset. This included Hu moments, Zernike moments, HOG descriptors, and LBP-TOP features. Investigated frame-level and video-level classification using an SVM classifier in SciKit-Learn.

Tulane University
Undergraduate Capstone, 2017 – 2018.
- Multimodal Sentiment Analysis for Voice Message Systems. Created a multimodal machine learning model to learn the urgency of a voice message after performing sentiment analysis. Used Python's SciKit-Learn and SDK libraries to apply emotion classification and unsupervised intensity regression on audio and text data.

PROFESSIONAL SERVICE

Reviewer
ECCV, WACV, Big Data, EMNLP, NeurIPS

Seminar Coordinator
Invited speakers and organized weekly meetings for the Image and Video Computing (IVC) group at Boston University.

OUTREACH & RESEARCH TALKS

Speaker – AI x Teens Summit
Phillips Exeter Academy, Spring 2021
Introduced Artificial Intelligence and fundamental research problems.

Graduate Mentor – ExploreCSR
Google & Boston University, Spring 2021
Served as a mentor and resource to marginalized undergraduate students to discuss research, graduate school, and career options.

Guest Speaker – Intro to Careers in Data & Tech (FY102)
Boston University, Spring 2021
Informed undergraduate students about pursuing a Ph.D. in computer science.

Research Talk – Artificial Intelligence Research Initiative
Hariri Institute for Computing, Spring 2020

Presented "Learning to Scale Multilingual Representations for Vision-Language Tasks" at the Artificial Intelligence Research (AIR) initiative.

AI Panelist – Girls Who Code
Boston University, Fall 2019
Participated in an Artificial Intelligence Panel held by Girls Who Code at Boston University to inform women of the graduate school application process.

Research Talk – Artificial Intelligence Research Initiative
Hariri Institute for Computing, Summer 2019
Presented "Language Features Matter: Effective Language Representations for Vision-Language Tasks" at the Artificial Intelligence Research (AIR) initiative.

Guest Speaker – AI4ALL
Boston University, Summer 2019, 2020
Presented introduction to vision and language topics during the AI4ALL program which encourages high school women to get involved with Artificial Intelligence, hosted by Boston University.

SELECTED COURSEWORK

Boston University
- Image and Video Computing (CS585)
- Advanced Optimization Algorithms (CS591E1)
- Deep Learning (CS591S1)
- Intro to Natural Language Processing (CS585)

Tulane University
- Machine Learning (CS4720)
- Intro to Machine Learning (CS3240)

MENTORING

Zora Che Undergraduate Student, Boston University, 2021
Carley Reardon Masters Student, Boston University, 2021
Sanjna Agrawal Undergraduate Student, Boston University, 2020-2021

SKILLS

Programming Languages Python, Ruby on Rails, MATLAB
Tools PyTorch, TensorFlow, SciKit-Learn, Git