Joshua A. Bowren
Curriculum Vitae

University of Miami
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Research Interests

Computational Neuroscience, Vision, Sparse Coding, Machine Learning

Education

PhD., **Computer Science**, (In Progress) Specializing in Computational Neuroscience 2018 – 2023
University of Miami, Advisor: Dr. Odelia Schwartz

B.S., **Computer Science**, Minor in **Mathematics**, 2014 – 2018
University of Central Florida, Honors: *Summa Cum Laude*
Overall GPA: 3.94

Positions

Research Assistant – Department of Computer Science, June 2018 – Present
University of Miami
- Advisor: Dr. Odelia Schwartz

Research Assistant – Institute for Simulation and Training, August 2016 – May 2018
University of Central Florida
- Advisor: Dr. R. Paul Wiegand
- Compressing images by removing certain spatial frequencies in luminance and color.
- Employing a sparse coding based method for image/video compression.

Research Intern – Princeton Neuroscience Institute, June 2017 – August 2017
Princeton University
- Advisor: Dr. Jonathan Pillow
- Explored hierarchical sparse coding (Karklin and Lewicki, 2003) capabilities and issues when performed on natural image data.
- Performed sparse coding with an exponential prior.
  - Found basis functions that were shorter and smaller than regular sparse coding.

Research Assistant – Department of Computer Science, June 2014 – May 2017
University of Central Florida
- Advisor: Dr. Kenneth Stanley
- Developed agent simulator and Real-Time Autoencoder-Augmented Hebbian Network (RAAHN) implementation.
- Found RAAHN to perform better with a novelty-based history buffer.
- Gave oral presentation at ALIFE XV on RAAHN with the novelty-based history buffer.

Publications

Bowren J.A., Pugh J.K., and Stanley K.O. (2016). Fully Autonomous Real-Time Autoencoder-Augmented Hebbian Learning through the Collection of Novel Experiences. In *Proceedings of the Fifteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE XV)*, Cancun, Mexico. Cambridge, MA: MIT Press (8 pages).
Acceptance Rate for Oral Presentation: 39%

Technical Experience

Programming Languages: C/C++, Python, Java, and C#
APIs and Frameworks: OpenGL, OpenCV, SDL, SFML, Android SDK and NDK

Selected Software

sparsecoding – A sparse coding implementation in C++ with OpenCV using iterative soft thresholding (ISTA) to infer sparse coefficients.
Git: https://notabug.org/jbowren/sparsecoding

raahnsimulation – A simulator for conducting research with the Real-time Autoencoder-Augmented Hebbian Network (RAAHN) Algorithm. Written in C# with GTK#.
Git: https://gitlab.com/jbowren/raahnsimulation

libraahn – A RAAHN implementation written in C#.
Git: https://gitlab.com/jbowren/libraahn

Fellowships

National Science Foundation Graduate Research Fellowship 2018

- 2000 applicants selected from a pool of 12000

Awards

UCF Distinguished Undergraduate Researcher Award
UCF Showcase of Undergraduate Research Judges' Choice Award
UCF Office of Undergraduate Research Travel Award
UCF First Year Scholar
UCF President's Honor Roll
UCF Department of EECS Dean's List