Nicolas Shu

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Education

Georgia Tech
PhD Machine Learning, 2023 3.7/4.0
MS Electrical Eng., 2021 3.7/4.0
MS Computer Sci., 2021 3.7/4.0
Specialization: Machine Learning

Boston University
MS Biomed. Eng., 2017 3.9/4.0
Late Entry Accelerated Program
Specialization: Robotics

Binghamton University
BS Biochemistry, 2015 3.6/4.0

Skills

- Tensorflow
- PyTorch
- Python
- Linux
- D3.js
- Javascript
- Matlab
- OpenCV
- Scipy / Sklearn
- Pandas
- Docker
- SLURM / PBS
- Inkscape
- C++
- Self-Hosting

Experience

CLIFFORD LAB, EMORY UNIVERSITY SCHOOL OF MEDICINE, ATLANTA GA
ESP LAB, GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA GA
Machine Learning Graduate Research Assistant — May 2018-Present

- *Created a speech/noise/music classifier with an attention layer with accuracy of above 96%, while maintaining a low footprint of 335MB in memory, making it suitable for embedded systems*
- *Cooperatively organized and performed an installation of 35+ RPis across a built environment for the monitoring of people with mild-cognitive impairment, including cameras, microphones, and temp/humidity/light sensors, after calibrating 140 microphones*
- *Setup initial time-series database InfluxDB to log data collected from various devices in a built environment*
- *Expanded the MUSIC and SRP-PHAT algorithms to 2D in order to determine direction of arrival of signals arriving at simulated microphone arrays*
- *Wrote a GUI to process LIDAR data to map the interior of a home, using D3.js*

NATIONAL EMERGING INFECTIOUS DISEASES LABORATORIES, BOSTON MA
Biomed Eng Graduate Research Assistant — May 2016-July 2017
Project: Assay Development to Detect H2O2 in TX-TL Cell Free Systems

QIANG GROUP, BINGHAMTON NY
Biochem Undergraduate Research Assistant — Jan 2014-May 2015

Projects

MAXIMUM COVERAGE CONTROL OF OMNIDIRECTIONAL SENSORS OVER NON-SIMPLY CONNECTED ENVIRONMENTS
- *Created a new framework to perform max. cov. control in a swarm of directional and omnidirectional agents*
- *Designed control barrier functions and improved on Lloyd's algorithm to allow swarm to maximize coverage in non-simply connected environments*
- *Ran Monte-Carlo simulations to estimate the optimal number of devices in a built environment before reaching diminishing returns*

AUDIOSOCKETS
- *Created a Python package with socket programming which would allow one to break from the synchronous behavior of Python, and allow one to do real-time audio processing via distributed computing with low latency*

AUTOMATED SEMI-GUIDED MAZE PATH PLANNING WITH TURTLEBOTS

FACE DETECTION WITH DALAL-TRIGGS ALGORITHM
- *Use Histogram of Gradients and sliding window to identify faces*
- *Implemented an adaptive non-maximal suppression algorithm to find the best keypoints*

USING LEVEL SETS TO DEVELOP ACTIVE SHAPE MODELS OF IMAGES

SCENE RECOGNITION WITH BAG OF WORDS USING SIFT DESCRIPTORS AND SVM

Q-LEARNING ALGORITHM FOR PATH PLANNING

ONLINE LEARNING CLASSIF. OF LIDAR OBSERVATIONS FOR AN ENVIRONMENT
- *Implemented Bayesian linear regression, perceptrons, and SVMs to classify environments based on LIDAR data*

ADVERSARIAL SEARCH ON A QUEENS ISOLATION GAME WITH MINIMAX AND ALPHA-BETA PRUNING

UTILIZING DECISION TREES AND RANDOM FORESTS FOR OPTIMAL CLASSIFICATION

ASL INTERPRETATION WITH DYNAMIC TIME WARPING ALGORITHMS AND HMMS

IMAGE SEGMENTATION WITH GAUSSIAN MIXTURE MODELS AND KNN

Papers

- N. Shu, Y. Wang, D. Caulley, D. Anderson, G. Clifford "An low consumption VAD for embedded devices" Interspeech 2022 (*Under Review*)
- N. Shu, P. Suresha, D. Anderson, G. Clifford "Audiosockets: A Python socket package for Real-Time Audio Processing" Interspeech 2022 (*Under Review*)
- N. Shu, C. Abdallah, D. Anderson, G. Clifford "Maximum Coverage with Sensor Network of Omnidirectional Sensors on Non-Simply Connected Environments" (*Under preparation*)
- C. Feustel, N. Shu, D. Anderson, G. Clifford, C. Zimring "Practical Environmental Sensing for Sleep in Real Environments" PErvasive Technologies Related to Assistive Environments 2022 (*Under Review*)
- S. Hanz, N. Shu, J. Qian, N. Christman, P. Kranz, M. An, C. Grewer, W. Qiang "Protonation-Driven Membrane Insertion of a pH-Low Insertion Peptide", Angew Chem Int Ed Engl. 2016, 55 (40):12376-81 DOI:10.1002/anie.201605203.
- N. Shu, M. Chung, L. Yao, M. An, and W. Qiang "Residue-specific structures and membrane locations of the pH-Low insertion peptides by solid-state nuclear magnetic resonance", Nature Communications, 2015, 6 (7787) DOI: 10.1038/ncomms8787
- W. Qiang, R. Akinlolu, M. Nam, and N. Shu "Structural Evolution and Membrane Interaction of the 40-Residue \beta-Amyloid Peptides: Differences in the Initial Proximity between Peptides and the Membrane Bilayer Studied by Solid-State Nuclear Magnetic Resonance Spectroscopy" Biochemistry, 2014, 53 (48), pp 7503-7514 DOI: 10.1021/bi/501003n