

SenSIP Seminar Series

Quantum Image Fusion Methods for Remote Sensing

Presenter: Leslie Miller, MS Student in ECEE

February 26th, 2024, 3:00 PM

GWC 487 or <https://asu.zoom.us/j/88692267144>

This seminar will discuss algorithms, simulations, and results using machine learning and quantum image fusion algorithms for radar and remote sensing applications. Previous efforts in the classification of synthetic aperture radar (SAR) images using quantum machine learning provided encouraging results but, nevertheless modest accuracy. In this paper, we propose a novel quantum image fusion technique used for identifying and classifying objects obtained from C-band SAR and optical images.

More specifically, we design a four-qubit quantum circuit to process the SAR image dataset. This method enhances the spectral details otherwise not seen when using the raw SAR dataset. In addition to the quantum circuit, we design deep neural networks (NN) to improve classification results. The Visual Geometry Group 16 (VGG16), a convolutional neural network that is sixteen layers deep, is customized and used for classification. The merit of quantum fusion as well as the promising results in improving the overall system and lowering size, weight, power, and cost (SWaP-C) is described.

Biography:



Leslie Miller is pursuing a Master's degree in Electrical Engineering with a focus in signal processing and communication systems from Arizona State University. She will be graduating Summer 2024 with her Master's degree in Electrical Engineering.

Leslie began her work in the SenSIP center laboratory in the summer of 2022. She has been an active graduate research assistant and an NSF REU recipient focused on exploring quantum computing algorithms for classifying SAR data. In addition to her work with the SenSIP center, she has completed three internships as a civilian engineer with the United States Space Force, as well as served as the President for the IEEE - Eta Kappa Chapter in 2023. She received the ASU Fulton Impact Award and was the convocation speaker for the Fulton Schools in May 2023.

The work presented in this seminar is sponsored in part by the SenSIP center, the NSF, and the Quantum Collaborative. Parts of this work will be presented at the IEEE Aerospace Conference.

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<http://engineering.asu.edu/sensip>

