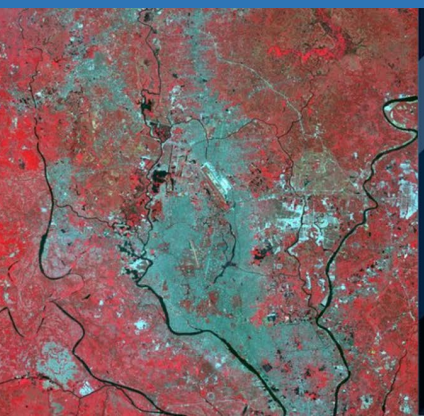
Challenge Problems @ the 2024 NIST/IEEE Conference on Computational Imaging Using Synthetic Apertures (CISA)

National Institute of Standards and Technology | Boulder | Colorado | 20-23 May 2024



The IEEE Signal Processing Society, the IEEE Geoscience and Remote Sensing Society (GRSS), the GRSS Standards Committee, the IEEE Synthetic Aperture Standards Committee, and the IEEE Synthetic Aperture Technical Working Group, together with the National Institute of Standards and Technology (NIST) invite you to the picturesque NIST campus in Boulder, Colorado for the ***NIST-IEEE Conference on Computational Imaging Using Synthetic Apertures (CISA).*** CISA is especially interested in contributions that address the challenge problems described below. These problems are of high-priority interest to the synthetic aperture standards and research communities. The goal is to focus community attention on these important issues and facilitate timely solutions. CISA is accepting papers until ***February 29*** related to:

1. **Synthetic Aperture Radar (SAR) Image Quality** – Satellite imagery is now available on the open market from a variety of commercial vendors. A challenge to the acquisition and standards community is to define metrics that define the quality of a SAR image. Proposed solutions to this challenge problem allow SAR images derived from different hardware platforms and vendors to be compared on an equal basis. Quality metrics are also useful for developing algorithmic approaches that optimize specific tasks, such as focusing, during the SAR image formation process.
2. **Magnetic Resonance Imaging (MRI) Quality** – MRI is a vital diagnostic tool and a classic application of computational imaging. The MRI industry has experienced profound advances in hardware and examples range from new machines capable of creating magnetic field strengths of 7 Tesla to equally state-of-the-art machines that are portable but generate only 1.5 Tesla. MRI quality metrics provide an objective yardstick that can be used to compare images derived from the wide range of machines available. In clinical settings, understanding the quality of an image lends confidence to the final medical diagnosis.
3. **Integrated Sensing and Communication (ISAC) Angle of Arrival Estimation** – The 6th generation of wireless networks (6G) will integrate a sensing and object detection capability with routine communications. It is likely that future radar and SAR platforms will also incorporate a communications function into the same aperture. ISAC techniques that estimate the angle of arrival for objects in the environment are difficult to execute on platforms in motion, such as SAR, or using a single-input-single-output (SISO) architecture. Potential contributions towards this challenge problem are encouraged to address the geometric accuracy of angle estimates, communication performance metrics such as Bit Error Rate, and computational complexity.
4. **Source Localization and Angle Estimation Using Phaseless Apertures** – Some sensing technologies measure the intensity of electric fields only. Primary examples are quantum sensors, such as Rydberg probes, or lithium niobate piezoelectric devices. Other scenarios where phase information is lost include a swarm of drones with severe time-synchronization errors. This challenge problem seeks innovative approaches that geolocate objects detected by radio frequency (RF) waveforms but lack signal phase information.

Prospective authors should visit https://2024.ieeecisa.org/ for more details and to submit manuscripts. The minimum length of the initial manuscript is 2 pages and up to 4 pages are allowed, including figures, with a 5th page for references only. Templates are provided at https://2024.ieeecisa.org/paper-submission/. All manuscripts must adhere to IEEE formatting guidelines. CISA will be an in-person event and authors must attend to present their papers live at NIST. Authors who give a presentation at CISA will have their paper published in IEEE Xplore. For additional questions, please send email to info@2024.ieeecisa.org to contact the co-chairs; **Alexandra Artusio-Glimpse**, **Paritosh Manurkar**, **Samuel Berweger**, **Siri Jodha Khalsa**, **Corina Nafornita**, **Peter Vouras, and Kumar Vijay Mishra**.