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Food For Thought Seminar

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About Phase: Resolving Phase Errors in Synthetic Aperture Radar

Abstract:

Synthetic aperture radar (SAR) uses relative motion to produce fine resolution images from microwave frequencies and is a useful tool for regular monitoring and mapping applications. Unfortunately, if target distance is estimated poorly, then phase errors are incurred in the data, producing a blurry reconstruction of the image. In this talk, we introduce a multistatic methodology for determining these phase errors from interferometry-inspired combinations of signals. To motivate this, we first consider a more general problem called phase retrieval, in which a signal is reconstructed from linear measurements whose phases are either unreliable or unavailable. We apply certain ideas from phase retrieval to resolve phase errors in SAR; specifically, we use bistatic techniques to measure relative phases and then apply a graph-theoretic phase retrieval algorithm to recover the phase errors. We conclude by devising an image reconstruction procedure based on this algorithm, and we provide simulations that demonstrate stability to noise.

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