UNCLASSIFIED

Information Science and Technology Seminar Speaker Series

Michael Robinson
American University

A Unified Framework for Multi-INT Signal Processing

Wednesday, June 18, 2014

3:00 - 4:00 PM

TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: Analysts must understand the behaviors and intent of targets from persistent, but sporadic observations. This is a signal processing problem, in which data sources could be traditional sensors or other analytics. The available data sources have different capabilities and back end data processing chains -- making their resulting data streams inconsistent. This frustrates their use by automated inference algorithms because a consistent mathematical theory of fusion has not been developed.

It is therefore imperative that we develop a unified mathematical theory of data fusion that permits assembly of local sensor coverage regions into a global picture. Such a theory must also inspire effective, practical algorithms that exploit whatever sensor resources are available, and suggest ways to redeploy sensors for more effective collection.

The mathematical theory of sheaves appears to meet these needs, and has recently become useful in signal processing, providing new insight into such traditional topics as sampling theory, filter design, and detection processing. However, sheaves based on partially ordered sets are poised to make inroads into more complex problems involving target identification, track disambiguation, sensor handoff, and false alarm suppression.

Since sheaves are not commonplace in signal processing, the talk will explain why they are uniquely valuable and effective. The discussion will center around critical illustrative examples that are particularly challenging for traditional methods, but are treated effectively by sheaves.

Biography: Michael Robinson is an applied mathematician working as an assistant professor at American University. He is interested in signal processing, dynamics, and applications of topology.

He earned a Bachelor's degree in Electrical Engineering (2002) and a Master's degree in Mathematics (2003) from Rensselaer Polytechnic Institute. From that time, he has worked on projects involving radio propagation and network planning, bistatic radar processing, and advanced radar simulation. In 2008, he earned a Ph.D. in Applied Mathematics at Cornell University in which he developed topological methods for studying the dynamics of parabolic equations. His more recent efforts follow an emerging trend started during a postdoc at the University of Pennsylvania of topologically-motivated signal processing techniques.

For more information contact the technical host Frank Alexander, fja@lanl.gov, 665-4518. If you wish to make an appointment to meet with Robinson please contact Josephine Olivas, jojo@lanl.gov, 663-5725.

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