TEXAS SOUTHERN UNIVERSITY
DEPARTMENT OF PHYSICS

An Effective Approach to Identification Fusion

Dr. Marvin N. Cohen
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3:30 p.m. – 4:30 p.m.
Room 146 Science and Technology Building

Biography

Dr. Cohen earned his BA in Math Education at Brooklyn College in 1970 and his MS and Ph.D. degrees in theoretical mathematics at the University of Miami in 1972 and 1978, respectively. He is currently CEO of his company, IRTA, Inc. He has been named an IEEE Fellow for his "contributions to radar waveform design and automatic target recognition development" and, until leaving GTRI in December 2007, after 27 years, was a Georgia Tech Research Institute Principle Research Scientist and an Institute Fellow. Dr. Cohen is the author of over 120 publications in the areas of radar, target identification, and sensor and identification fusion, including 5 chapters in four professional-level texts. He is also co-author, with Nathanson and Riley, of the text *Radar Design Principles, 2nd Edition*, published by McGraw-Hill in 1991 and which was re-released by SciTech Publishing in 1998. Professional society activities include Technical Chair of the 2012 IEEE International Radar Conference and numerous Session Technical Chair, Member of Technical Committee, and Tutorial-Provider activities spanning many years. His current interests are focused around single-sensor automatic target recognition; multi-sensor and source identification fusion; the development and application of specialized signal processing techniques for radar and sensor fusion applications; and waveforms and processing for multi-static radar systems.

Abstract

When we have access to more than one source of information about a decision we have to make, it is often difficult to know how to fuse that information so as to determine our best decision. A quantitative approach to identification fusion is presented. With no prior knowledge of the 'goodness' of each source's performance, one is reduced to utilizing a voting scheme. The approach presented in this talk assumes prior knowledge of the 'goodness' of each source in the form of the Confusion Matrix for each source for the problem at hand. Confusion Matrices are introduced and discussed. Then a process for optimally fusing two or more information sources, given that we know their Confusion Matrix characterizations, is presented. The technique is demonstrated utilizing sets of radar and FLIR (forward looking Infrared) decisions as to the type (e.g., tank, truck, jeep, etc.) when observing a set of military vehicles. It is shown that fusing the individual decisions in this way provides better identification performance than either the radar or FLIR sensors alone provide. Performance improvements are quantified and it is further shown that this technique can be tailored so as to function at any of a number of algorithm operating points and that the fusion algorithm is relatively robust to errors in the single-source Confusion Matrix characterizations.