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Algorithms for Synthetic Aperture Radar Imagery XVII

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Frederick D. Garber
Editors

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3 Advanced Motion Processing
Michael Minardi, Air Force Research Laboratory (United States)

4 Advanced Exploitation
Eric R. Keydel, SAIC (United States)

Introduction

This year's Algorithms for Synthetic Aperture Radar Imagery conference distinguished itself with a significant number of high quality papers including very promising research presented by exceptional students. The Advanced Image Formation I session chaired by Dr. Charles V. Jakowatz featured papers outlining various approaches to SAR image formation including bistatic backprojection, passive multi-static, k-space perspectives, and even computer-code modules for fundamental backprojection algorithms. These provide a nice compendium of tutorial papers on SAR.

In the Advanced Image Formation II session chaired by Dr. Lee C. Potter, the papers provided a nice mix of advanced imaging algorithms based on compressive sensing principles and of applications including through wall imaging and airborne imaging and display.

The Advanced Motion Processing session was chaired by Dr. Michael Minardi. It was encouraging to see the fundamental and initial efforts on the moving target challenge problem introduced at the conference last year. The four papers attacking this challenge problem focused on different aspects of this difficult scenario with each providing invaluable insight. The remainder of the papers investigated other important motion problems including the detection of vibrating objects in the SAR scene and the analysis of radar dismount signatures.

In the Advanced Exploitation session chaired by Eric R. Keydel, various aspects of SAR exploitation were presented. Two papers investigated the important problem of SAR simulation including its use in automatic target recognition. Other papers addressed the important problems of speckle reduction, target detection, and SAR automatic target recognition.

The 2010 challenge problem was introduced with two objectives. The first aspect is to develop SAR coherent change detection (CCD) algorithms applicable to X-band SAR imagery collected in an urban environment. The second relates to effective data compression of complex SAR images, where efficacy of the SAR CCD is the performance metric. A collection of X-band SAR imagery has been provided to support this development. To focus research onto specific areas of interest to AFRL, a number of challenge problems are defined. To request a copy of the data set, visit the AFRL/RYA Sensor Data Management System (SDMS) Public website https://www.sdms.afrl.af.mil/main.php.

The 2010 Best Student Paper Award goes to Mr. Kerry E. Dungan of The Ohio State University for his paper "Classifying sets of attributed scattering centers using a hash coded database." This is the first research effort that investigated ATR with "Gotcha" circular SAR type radars. As a first, the student demonstrated significant

resourcefulness as well as ingenuity in developing the data base, conceiving of an efficient and effective feature extraction approach, adapting his approach to the geometric distortions in wide-area circular SAR, and demonstrating a fast algorithm with high performance. Congratulations, Kerry!

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