Information Science and Technology Seminar Speaker Series

Dr. Miguel Velez-Reyes
University of Texas at El Paso

Integrating Spatial and Spectral Information in Hyperspectral Image Processing

Wednesday, September 9, 2015

3:00 - 4:00 PM

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

Abstract: Hyperspectral imaging (HSI) is an imaging technology that provides fully registered spatial and high spectral resolution (radiance, reflectance, or emission) information of the scene in the field of view of the sensor. Hyperspectral remote sensing is currently undergoing a revolution with the appearance and blooming development of hyperspectral imaging sensors available across a number of platforms such as UAV, stand-off, and commercial/military airborne and space-borne systems. It is possible to capture information about a region of interest at high resolution in the spatial, spectral and temporal domains. Therefore it is of great interest the development of models and algorithms for hyperspectral image processing that fully exploit the information in all three domains. This presentation will describe ongoing research work in integrating spatial and spectral information for hyperspectral image processing. We present two perspectives on how to integrate spatial and spectral information. In the first one, we think of the image cube as a vector valued function where diffusion PDEs are used for image enhancement and scale-space representations that are used as preprocessing stages in hyperspectral image exploitation tasks. In the second one, we think of the image cube as a 3D tensor array with locality properties that can be used in improved hyperspectral unmixing. We illustrate potential benefits of these approaches with real data sets in solving classification, unmixing, and interest point extraction in hyperspectral image processing.

Biography: Dr. Miguel Vélez-Reyes is the George W. Edwards/El Paso Electric Distinguished Professor in Engineering and Chair of the Electrical and Computer Engineering Department at The University of Texas at El Paso (UTEP). He received the BSEE degree from the University of Puerto Rico at Mayagüez, in 1985, and the MS and PhD degrees from the Massachusetts Institute of Technology in 1988, and 1992, respectively. He was a member of the faculty at the University of Puerto Rico at Mayaguez (UPRM) from 1992 to 2012. He has held faculty internship positions with the Air Force Research Laboratories, and NASA Goddard Space Flight Center. His research interests are in information extraction from dynamic systems using minimally intrusive (or nonintrusive) sensing, and signal and image processing algorithms for remote sensing. He has over 160 publications in journals and conference proceedings and has contributed to four books. He was the Founding Director of the UPRM Institute for Research in Integrative Systems and Engineering and was Associate Director of the NSF Center for Subsurface Sensing and Imaging Systems, a NSF Engineering Research Center led by Northeastern University. He was director of the UPRM Tropical Center for Earth and Space Studies, a NASA University Research Center. In 1997, Dr. Velez-Reyes was one of 60 recipients from across the United States and its territories of the Presidential Early Career Award for Scientists and Engineers (PECASE) from the White House. In 2005, Dr. Velez-Reyes was inducted in the Academy of Arts and Sciences of Puerto Rico. In 2010, Dr. Velez-Reyes was elected Fellow of SPIE for his contributions to hyperspectral remote sensing. He is a member of the Tau Beta Pi, Sigma Xi, and Phi Kappa Phi honor societies. He is senior member of IEEE and member of ASEE, SHPE, SACNAS, and AGU.

For more information contact the technical host James Theiler, jtheiler@lanl.gov, 665-5682.

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