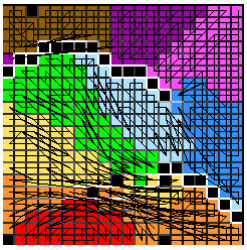
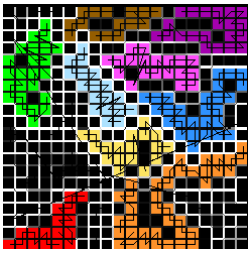
The Western New York chapter of the IEEE Geoscience and Remote Sensing Society and the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology jointly present a technical seminar

Hyperspectral Eyeing of Heavenly Bodies - a Machine Intelligence Approach



Dr. Erzsébet Merényi
Research Professor
Department of Electrical and Computer Engineering
Rice University, Houston, Texas



4 pm, Wednesday, November 4, 2009
Carlson Auditorium (Room 1125)
Chester F. Carlson Center for Imaging Science (Bldg 76)
Rochester Institute of Technology
Refreshments served at 3:30 pm

Abstract

Hyperspectral imaging provides powerful data for remote sensing scientific inquiries. At the same time, the high spectral dimensionality, the complex relationships among the spectral features, and the large number of material classes expected to be distinguished from these data, pose great challenges for information extraction methods. I will present results from terrestrial and planetary astronomy studies in which significant new knowledge was produced through clustering and classification of hyperspectral data with self-organizing neural machine learning. I will summarize the salient aspects of this paradigm – the focus of our research – which mimics the information processing of biological neural maps observed in the cerebral cortex, and enables to look at, and extract information from, large amounts of high-dimensional, complex data in ways traditional algorithms may not facilitate. I will also present capabilities on synthetic hyperspectral imagery from RIT, which takes algorithm validation to a whole new level.

Biography

Erzsébet Merényi earned an MS in mathematics (1975) and PhD in computational science (1980) from Szeged (Attila József) University, Hungary. She is a research professor in the Electrical and Computer Engineering Department of Rice University, Houston, Texas. She was formerly a staff scientist at the Lunar and Planetary Laboratory, University of Arizona, and a research associate in the Cosmic Physics Department at the Central Research Institute for Physics of the Hungarian Academy of Sciences. She worked on numerical modeling of charged particle transfer in the Heliosphere (1980–1990), and on analyzing images of the nucleus of P/Halley from the (then) Russian Vega mission. Her mathematical custom restorations of the severely corrupted, once-in-a-lifetime images were published by the European Space Agency, and are in international archives (PDS, IHW).

Since 1991 Erzsébet has been focusing on analyzing spectral data for resource mapping and knowledge discovery from space missions and terrestrial remote sensing projects, including data from Clementine, the Imager for Mars Pathfinder, the Mars Exploration Rovers, telescopic measurements, and airborne hyperspectral sensors such as AVIRIS. Most recently she has been collaborating on inference of latent parameters (such as surface temperature and grain size) from high-resolution spectra, in preparation for the Pluto-Charon encounter by the New Horizon mission.

Her overarching research interest is in neural machine intelligence for manifold learning, structure discovery and precise classification, in complex, high-dimensional, highly structured data such as hyperspectral imagery and medical data. Her research has been funded by several NASA programs, and by the Baylor College of Medicine. At Rice she also co-leads the machine learning effort in a large DARPA – Rice compiler development project.