ically in relatively complex algorithms (involving multiple threads), and thus shows the potential to relieve more of the programmer's cognitive load as the problem grows in complexity. SequenceL's runtime environment then selects which parallelisms to actually exploit, with the aim of maximum overall speed when considering communication costs between processes.

This work was done by Daniel Cooke and J. Nelson Rushton of Texas Tech University for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15859-1

Remote Data Exploration with the Interactive Data Language (IDL)

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A difficulty for many NASA researchers is that often the data to analyze is located remotely from the scientist and the data is too large to transfer for local analysis. Researchers have developed the Data Access Protocol (DAP) for accessing remote data. Presently one can use DAP from within IDL, but the IDL-DAP interface is both limited and cumbersome. A more powerful and user-friendly interface to DAP for IDL has been developed.

Users are able to browse remote data sets graphically, select partial data to retrieve, import that data and make customized plots, and have an interactive IDL command line session simultaneous with the remote visualization. All of these IDL-DAP tools are usable easily and seamlessly for any IDL user.

IDL and DAP are both widely used in science, but were not easily used together. The IDL DAP bindings were incomplete and had numerous bugs that prevented their serious use. For example, the existing bindings did not read DAP Grid data, which is the organization of nearly all NASA datasets currently served via DAP.

This project uniquely provides a fully featured, user-friendly interface to DAP from IDL, both from the command line and a GUI application. The DAP Explorer GUI application makes browsing a dataset more user-friendly, while also providing the capability to run user-defined functions on specified data. Methods for running remote functions on the DAP server were investigated, and a technique for accomplishing this task was decided upon.

This work was done by Michael Galloy of Tech-X Corporation for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16021-1

Mixture-Tuned, Clutter Matched Filter for Remote Detection of Subpixel Spectral Signals

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Mapping localized spectral features in large images demands sensitive and robust detection algorithms. Two aspects of large images that can harm matched-filter detection performance are addressed simultaneously. First, multimodal backgrounds may thwart the typical Gaussian model. Second, outlier features can trigger false detections from large projections onto the target vector.

Two state-of-the-art approaches are combined that independently address outlier false positives and multimodal backgrounds. The background clustering of Funk et al. models multimodal backgrounds, and the mixture tuned matched filter (MT-MF) of Boardman et al. addresses outliers. Combining the two methods captures significant additional performance benefits. The resulting mixture tuned clutter matched filter (MT-CMF) shows effective performance on simulated and airborne datasets.

The classical MNF transform was applied, followed by k-means clustering. Then, each cluster's mean, covariance, and the corresponding eigenvalues were estimated. This yields a cluster-specific matched filter estimate as well as a cluster-specific feasibility score to flag outlier false positives.

The technology described is a proof of concept that may be employed in future target detection and mapping applications for remote imaging spectrometers. It is of most direct relevance to JPL proposals for airborne and orbital hyperspectral instruments. Applications include subpixel target detection in hyperspectral scenes for military surveillance. Earth science applications include mineralogical mapping, species discrimination for ecosystem health monitoring, and land use classification.

This work was done by David R. Thompson, Lukas Mandrake, and Robert O. Green of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-48663