Displaying Properties of PDFs

Ames Research Center, Moffett Field, California

PDFVis is a computer program that assists in visualization of uncertainty as represented by a probability density function (PDF) located at each grid cell in a spatial domain. PDFVis performs the following functions:

• Creates maps of first-, second-, and third-order statistics of the PDFs, displaying the maps simultaneously in one image;

• Provides an interactive probe that displays various forms of density estimates (e.g., histogram or kernel density estimator) of the PDF at a grid cell or larger region selected by the user;

• For grid cells in a row or column selected by the user, it displays surfaces of the PDFs as shaded walls and as color-mapped wall according to a scalar variable selectable by the user;

• Displays the modality (basically, the number of peaks) and the locality of the peaks of the PDF in each grid cell;

• Provides a capability for querying the modalities of the PDFs on the basis of ranges and other criteria specified by the user; and

• Facilitates interactivity by providing simple user command keys.

This program was written by David Kao and Jennifer Dungan of Ames Research Center and David Kao of The Regents of the University of California Santa Cruz. Further information is contained in a TSP (see page 1).

Inquiries concerning rights for the commercial use of this invention should be addressed to the Ames Technology Partnerships Division at (650) 604-2954. Refer to ARC-15039-1

Modular Filter and Source-Management Upgrade of RADAC

Goddard Space Flight Center, Greenbelt, Maryland

In an upgrade of the Range Data Acquisition Computer (RADAC) software, a modular software object library was developed to implement required functionality for filtering of flight-vehicle-tracking data and management of tracking-data sources. (The RADAC software is used to process flight-vehicle metric data for real-time display in the Wallops Flight Facility Range Control Center and Mobile Control Center. This software is part of the Range Control/Range Safety System used to contain impacts of debris from flight-vehicle operations.) The library includes implementations of tracking-data-editing and -filtering techniques that can be readily found in the literature and was constructed to facilitate future incorporation of implementations of other, more-exotic filtering techniques. A pragmatic technique is used to maintain statistics on differences between measurements and estimates of positions in order to compute a figure of merit for each radar, Global-Positioning-System, or inertial-navigation-system source of tracking data.

An automatic source-qualification technique is implemented to enable optional replacement of a pre-existing manual data-qualification function. The library was written in the C++ language and was designed to be hosted within an application program running on virtually any computing platform.

This program was written by R. James Lanzi and Donna C. Smith of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-14974-1

Automatic Command Sequence Generation

NASA's Jet Propulsion Laboratory, Pasadena, California

Automatic Sequence Generator (Autogen) Version 3.0 software automatically generates command sequences for the Mars Reconnaissance Orbiter (MRO) and several other JPL spacecraft operated by the multi-mission support team. Autogen uses standard JPL sequencing tools like APGEN, ASP, SEQGEN, and the DOM database to automate the generation of uplink command products, Spacecraft Command Message Format (SCMF) files, and the corresponding ground command products, DSN Keywords Files (DKF). Autogen supports all the major multi-mission mission phases including the cruise, aerobraking, mapping/science, and relay mission phases.

Autogen is a Perl script, which functions within the 'mission operations' UNIX environment. It consists of two parts: a set of model files and the autogen Perl script. Autogen encodes the behaviors of the system into a model and encodes algorithms for context-sensitive customizations of the modeled behaviors. The model includes knowledge of different mission phases and how the resultant command products must differ for these phases. The executable software portion of Autogen, automates the setup and use of APGEN for constructing a spacecraft activity sequence file (SASF). The setup includes file retrieval through the DOM (Distributed Object Manager), an object database used to store project files. This step retrieves all the needed input files for generating the command products.

Depending on the mission phase, Autogen also uses the ASP (Automated Sequence Processor) and SEQGEN to generate the command product sent to the spacecraft. Autogen also provides the means for customizing sequences through the use of configuration files. By automating the majority of the sequencing generation process, Autogen eliminates many sequence generation errors commonly introduced by manually constructing spacecraft command sequences. Through the layering of commands into the sequence by a series of scheduling algorithms, users are able to rapidly and reliably construct the desired uplink command products.

With the aid of Autogen, sequences may be produced in a matter of hours instead of weeks, with a significant reduc-