Intelligent Information Fusion and Management Prototype Applicable to EOSDIS

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http://iifs.gsfc.nasa.gov/presentations/

Objective

Develop a prototype proof of concept Earth science data and information system that removes the burden of a non-EOS user of having to understand the system architecture, data content or system language.

Goal

Build upon ongoing research in the development of an Intelligent Information Fusion System with the expressed purpose of incorporating and evaluating state-of-the-art techniques for handling EOS-era scientific data challenges. This will assume high risk without “shocking” the ongoing developments (V0, V1 etc).

As technologies mature, demonstrate and make available to appropriate EOSDIS “V” series. Stress transportability of technical developments into other EOS related programmatics (e.g., direct readout).

Technology Areas

- Object-oriented databases & temporal information
  R. Cromp (NASA/GSFC), N. Pissinou (U. SW. Louisiana), K. Wichmann (GS&T)

- Data compression, automated georegistration, browse techniques
  J. Tilton (NASA/GSFC), J. LeMoigne (USRA/CESDIS), M. Mareboyana (Bowie State U.), B. Lerner & J. Pierce (KT-Tech Inc.)

- Data characterization, image search by content
  R. Cromp (NASA/GSFC), N. Netanyahu (USRA/U. MD)

- Planning/scheduling for product generation and data analysis tasks
  N. Short, (NASA/GSFC), A. Lansky (GS&T)
  (NASA/ARC), W. Ligon (Clemson U.)

- Data representation and visualization
  R. Cromp (NASA/GSFC), G. Fekete (HSTX), K. Wichmann (GS&T)

Implementation Plan

- Year 1
  - model data/user profile in OODBMS
  - select subset of representative data and method for first cut at characterization of image data
  - interface IIFS user interface with data archive
  - test wavelets for image browse
  - develop first cut hybrid auto-georegistration technique
  - knowledgebase planner for characterization techniques

- Year 2, 3
  - automated coordinating of entire data analysis pipeline (IIFS)
  - develop more robust characterization schemes
  - add characterization algorithms to system
  - refine temporal logic in OODBMS
  - investigate performance of data flow throughout entire system
  - gather performance statistics on entire system
  - add additional data sets for scalability metrics

Highlights

- **MacTac Level Zero Processing System**
  - **Ingests HRPT & CCSDS formats**
  - **Ingests at 15 Mbs/second**
- **Wavelets for Image Browse**
  - **http://sdcd.gsfc.nasa.gov/ESS/annual.reports/ess95contents/app.inhouse.lemoigne.html**
- **Khoros Image Processing Toolkits**
  - **PVQ Data Compression (**M. Mareboyana), **Image Segmentation (J. Tilton), Probabilistic Neural Networks**
  - **TIROS Standard Products (Level 1, NDVI, Snow-Ice,...)**
- **Remote-Sensing OODBMS Search Engine**
  - **WWW Browser interface to the IIFS (http://iifs.gsfc.nasa.gov/ais/IIFS-html/mtpe.html)**
  - **Search over 50 Gigabytes of on-line Landsat, Tiros, and Goes data**
  - **Search by Content for real-time AVHRR data**

Highlights (cont.)

- **Collage/Khoros Knowlege-Based Planning System**
  - **online tutorial http://balmure.gsfc.nasa.gov/collage-manual/usermanual-greetings.html**
  - **example Knowledge Base for TIROS standard products**
- **On-line Tutorial in Remote Sensing written by author of Mission To Earth**
  - **Focus on science of image interpretation for aiding development of contents-based search techniques**
  - **http://iifs.gsfc.nasa.gov/ais/IIFS-html/LT/NewTutorial/nicktutor1.html**