Reprinted from

Symposium on

Machine Processing of

Remotely Sensed Data

and

Soil Information Systems

and

Remote Sensing and Soil Survey

June 3-6, 1980

Proceedings

The Laboratory for Applications of Remote Sensing

Purdue University
West Lafayette
Indiana 47907 USA

IEEE Catalog No.
80CH1533-9 MPRSD

A SOFTWARE SYSTEM FOR THE DIGITAL ENHANCEMENT AND CLASSIFICATION OF MULTI-EMULSION PHOTOGRAPHIC DATA

JAMES DEIGAN
OPTRONICS International, Inc.

JOHN SZAJGIN, PAUL BRUNS AND KURT OLSON
University of New Hampshire

A software system for the digital enhancement and classification of multi-emulsion photographic data has been developed utilizing the University of New Hampshire's DECsystem-10. Input is from high altitude color infrared photography scanned by a high resolution rotating drum microdensitometer. The digitizing process utilizes color separation filters to measure optical densities from each film emulsion layer. The analysis software is generalized, and with little modification will accept and process other multi-spectral data, such as that of Landsat.

Subscenes of interest are extracted from the raw data files on magnetic tape and written out as disk files for easy access. Preprocessing methods useful in enhancing the image data for the benefit of the analyst include contrast stretching, edge enhancement, spatial filtering, and band ratioing. Classification capabilities include an unsupervised algorithm based upon Euclidean distance and utilizing a spatial mask for generating "seed cluster" centroids. Supervised classification is by either Euclidean distance or Parallelpiped decision rules. Output products are classification statistics and line printer gray shade/character maps.

The nature of the software, capabilities, and output products has been strongly influenced by the attempt to develop a readily transportable FORTRAN software system with minimal core requirements, rapid processing capabilities and a wide range of applications.

EARTH OBSERVATIONS DIVISION LANDSAT IMAGERY PREPROCESSING SYSTEM

P. M. HINSON AND C. H. JEFFRESS
Lockheed Engineering & Management Services

The Earth Observations Division (EOD) at NASA's Lyndon B. Johnson Space Center (JSC) has recently placed into operation a new system to receive and process the Landsat imagery output of the Master Data Processor (MDP) located at the Goddard Space Flight Center (GSFC). The main purposes of the EOD System are to (1) extract areas of interest (AOI) from full scenes (170 km X 185 km) and (2) provide source data to users of Landsat imagery. The EOD system consists of two major subsystems: Multi-spectral scanner (MSS) imagery reception and AOI extraction.

The imagery reception subsystem acquires the data signal transmitted by GSFC to the EROS Data Center over the RCA Domestic Satellite service and monitored by JSC. These data are recorded at JSC on high density digital tapes (HDTS). GSFC also transmits inventory data over telephone lines to JSC, describing the contents of the HDT data stream.

The extraction subsystem selects AOI's from the full scenes by comparing the Goddard High-density Inventory Tapes (GHIT) with the users' requests. Then the required full scenes are read from the HDT's and converted from analog-to-digital. The requested AOI is then written to computer compatible tapes for subsequent image analysis.

NASA'S APPLICATIONS DATA SERVICE

JAN HEUSER
National Aeronautics and Space Administration, Washington, DC

Applications are evolving in the 80's from an era of exploration and inventory into an era of "exploitation". Atmospheric and earth scientists are collecting data to develop models and an understanding of natural phenomena. These models will be applied to research for nationwide problems such as pollution monitoring and control, water resources management, energy resources exploration and allocation, or natural disaster warning/alleviation. This means that discipline scientists in agriculture, oceans, atmospheres and others are tackling applications which require the timely access and integration of data from a dozen or more sources.

To meet these data access and integration challenges, the NASA Office of Space and Terrestrial Applications is planning an Applications Data Service or ADS. The ADS will provide a common service to electronically locate and access applications data as well as integrate the cross-correlative data sets required by multiple users. Its catalog and network services will increase data visibility as well as provide the data in a more timely manner, a more useable form.

Over the past year, we have explored the requirements, feasibility, potential scope of an ADS. Because of the complexity and scope of the OSTA data access problem, an ADS pilot implementation/evaluation activity is considered an essential precursor to any full-scale system implementation.

Therefore, we are presently defining 2 to 3 small ADS pilot systems, in the research areas of atmospheres, oceans and potentially agriculture. These act as test beds to test and evaluate alternative ADS cataloging and networking concepts, data access and integration techniques, etc. Common interface and data format standards will allow future interconnection of the independent pilot systems into an "integrated" ADS pilot system.

Pilots presently are being defined for implementation and evaluation in the FY 1981-82 timeframe. Full-scale ADS implementation by NASA is planned to start in the mid-80's. This paper will describe the ADS (full-scale ADS) concept and plans; it will discuss how the ADS fits into the future "Overall OSTA Data System"; it will describe the pilot systems, their architecture and purpose.