Management, Dissemination, Discovery and Exploitation of Imagery at ArcGIS10

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Maximizing the Value of Imagery

• Providing imagery:
  – Timely
    • Value is highest when new
  – Quickly
    • Fast display
  – Accurately
    • Correct location and metadata

• Exploiting the rich information content:
  – Resolution
    • Use full spatial content with maximum quality
  – Temporal change
    • Enable time control
  – Spectral range
    • Utilize multiple bands
  – Dynamic range
    • Utilize sensitivity for sensors
GIS and Imagery, Integrated and Accessible

- Actionable information and knowledge
- Unified geospatial workflows

GIS

Field Users
Decision Makers
Analysts
Data Managers

Knowledge Base
Base Maps & Globes
Georeferenced Content
Sensor Networks
Imagery
Imagery is Core to a Complete GIS

• Management
  – All forms of geospatial data
    • Vector, Image, Maps, TIN, Networks, …
  – Image Data Management

• Dissemination
  – Accessibility to data, information and knowledge
    • Services, Sharing, Standards
  – Providing image accessibility

• Visualization
  – Interpretability and human understanding
  – Imagery display in many applications

• Analysis
  – Gain knowledge to make informed decisions
  – Extracting the information from imagery

ArcGIS is a Complete GIS Based Image System
ArcGIS - For Image Data Management
Cataloging, Metadata and Processing

Wide Range of User Needs:

• **Work Station User**
  “What do I have? How can I easily work with it?”

• **Organizations with collections of existing imagery and rasters**
  “How do I serve all our orthoimages?”

• **Enterprises collecting new imagery**
  “How do I process and serve imagery that we acquire?”

Catalog all available imagery
Make it quickly accessible in the required form
GeoDatabase - Mosaic Dataset
Management of Small to Vast Collections of Imagery

• Catalog/Library of all imagery & associated metadata
• Stored in GeoDatabase
• Massively Scalable
• References original pixels as files or database
• Define processing / functions

• Authored and Accessible directly in ArcGIS Desktop

• Automation using GeoProcessing Tools & ArcObjects

• Accessible as:
  – Image
    • Dynamically Mosaicked
    • Processed on the fly
  – Catalog
    • Table with geometry & metadata

Resolves the traditional issues associated with image data management
Demo – Image Data Management
Dynamic Mosaicking

Mosaic Imagery On-demand

- Fuse of overlapping imagery from multiple sources
- User control of Image Order
  - By Date – ‘Latest’, ‘Closest to May 2001’
  - By Attribute – ‘Highest Sun Angle’
  - By Viewpoint – North, South, East, West
  - Seamline – Feathered blend
  - User Query – ‘Landsat imagery, with no cloud, later than June 2001’
- By default users see best available imagery

Exploit the Overlap in Imagery
Dynamic Mosaicking Resolves Traditional Image Management Issues

- **Processing Time**: Reduces processing
- **Overlapping Imagery**: Maintain information
- **Disparate Datasets**: Handle large NoData areas
- **Image Quality**: Reduces resampling
- **Storage**: Reduces storage by removing redundancy
- **Multi-resolution Data**: No need to sample up or down
- **Maintenance**: Add imagery as required
- **Maintain Metadata**: Valuable information
On-The-Fly Processing
Create Multiple Products from a Single Source

• Define Processing functions as part of Mosaic Dataset

• Imagery Processed as Accessed

• Processes
  • Orthorectify
  • PanSharpen
  • Extract Bands
  • Vegetation Index
  • Classify
  • Shaded Relief
  • Crop to Footprint
  • Enhance
  • Color Correction
  • ...

Utilize the image information content
On-The-Fly Processing
Resolves Issues with Traditional Image Processing

• Traditional Processing

• On-The-Fly Processing

• Resolves:
  – Processing time
  – Multiple intermediate products
  – Additional storage
  – Loss of information
  – Difficulty making changes or maintenance
  – High risk of delays
Patterns to Manage Imagery

* Generally want to minimize number of Mosaic Datasets

- **Simple Collection**

  - Multiple Files
  - Format
  - Projections
Patterns to Manage Imagery

*Generally want to minimize number of Mosaic Datasets*

- **Simple Collection**

- **Cascaded Mosaic**
  
  Consider each Mosaic as a RasterDataset
Patterns to Manage Imagery

Generally want to minimize number of Mosaic Datasets

- Simple Collection
- Cascaded Mosaic
- Multi-Source Collection

Single Mosaic of many Sources
Patterns to Manage Imagery

Generally want to minimize number of Mosaic Datasets

- Simple Collection
- Cascaded Mosaic
- Multi-Source Collection
- Merged Mosaics
Reference Mosaics

- Mosaics derived from Mosaics
  - Additional processes
  - Queries
  - Properties
- Simplify derived product
- Reduces redundancy

Add NDVI Process

Where Sensor = QuickBird

Where Sensor = Landsat and Cloud <10% and Intersect with Spain
Dissemination

Providing Image Accessibility
Three Patterns for Image Access

Direct

Static

Dynamic

ArcGIS is unique in providing all three
Direct Access to Imagery
Traditional Workstation Access

- **Raster Datasets**
  - Nearly all image formats
    - TIF, IMG, NITF, JPEG2000, ...

- **Raster Types**
  - Common Imagery Sensors
    - QuickBird, Ikonos, SPOT, Aerial Frame, ...

- **Mosaic Dataset**
  - References to rasters, metadata and processing
Static Web Services
Imagery Optimized for Web Delivery

- **Map Cache**
  - Most scalable web delivery
  - Created and served using ArcGIS Server
  - Can utilize Mosaic Datasets as the source

- **Accessible**
  - ArcMap
  - ArcGIS Explorer
  - WebAPIs/Mashups

- **ArcGIS Online Provides**
  - World Imagery
  - Ikonos 1m 700+ metro. Areas
  - User submitted content

www.argisonline.com

Imagery as a very fast background
ArcGIS Image Services

Extensive Web Based Image Functionality

- Dynamic Image Service
  - User defined projection and rendering
- Directly from source raster dataset
- Changeable Compression
- Return image or pixel values

- Accessible
  - ArcMap
  - ArcGIS Explorer
  - WebAPIs (Silverlight, Flex, JavaScript)
  - OCG WMS, WCS, KML
  - 3rd Party Applications

Imagery as Background & Analysis
ArcGIS Server Image Extension
Serving Large Imagery Collections

- Serve Mosaic Dataset
- Image Services Accessible as:
  - Image
    - Dynamic Mosaicking
    - On-the-fly processing
    - Identify
    - Export
  - Catalog
    - Query
    - Selection
    - Download, with clipping

Maximizing the Value of Imagery
Visualization

Visualize
ArcGIS - For Image Visualization
Better Interpretation and Understanding of Imagery

- Quick Access
- Improved Quality
- Fast / Accelerated Display
- Image Enhancement
- Multiple Applications
  - ArcGIS Desktop
  - ArcGIS Explorer
  - Web APIs
  - 3rd Party Applications
Demo – Image Visualization
ArcGIS – For Image Analysis
Exploiting the Value of Imagery

- Search and Discovery
  - Query for imagery
- Image Analysis Window
  - Enhancement
  - Interpretation
  - On-The-Fly Processing
- Image Classification Tools
  - Traditional Image Classification
ArcGIS – A Platform for Complete Imagery Solutions
Information Centric Workflows Enable Efficiency and Interoperability

- ESRI works closely with its Partners
- ArcGIS provides a platform
- Partners provide domain expertise

- Automated Feature Extraction
- Multispectral Analysis
- Hyperspectral Analysis
- Radar
- Specialized Sensor Support
- Stereo Display
- ...

DigitalGlobe
GeoEye
Trimble (Applanix)
SPOT
RapidEye
Microsoft (Vexcel)
Pictometry

i-cubed
PCI Geomatics
Trimble (Inpho)
MDA Federal

ITT VIS
BAE SYSTEMS
Overwatch

DAT/EM
PurVIEW
Qcoherent
Definiens
ArcGIS
The Platform for Fully Integrated GIS and Imagery

- Integrating Imagery as core to GIS
- Management, Dissemination, Visualization and Analysis
- Solution for wide range of user requirements
- Maximizes the value of imagery
Other Imagery Specific Technical Workshops at FedUC

- ArcGIS Image Services and the Image Extension – Friday 8:30 – 10:00, Room150A
- Image Services for Elevation Data – Friday 10:30 – Noon, Room150A

Learn More

http://www.esri.com/training

- Instructor-Led Training
  - Introduction to ArcGIS Server Image Extension
  - ArcGIS Server: Web Administration Using the Microsoft .NET Framework

- Free Web Training Seminar
  - Serving and Managing Imagery with ArcGIS

ESRI Training...keep critical skills up to date
Questions?

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