Ohio URISA Imagery Workshop

Visualization and Analysis of Remote Sensing Imagery in Google Earth and ArcGIS

Workshop organizer: University of Cincinnati and Ohio Urban & Regional Information Systems Association (URISA)

Date: Wednesday, November 7, 2012

Location: 415 and 406 Braunstein Hall, Department of Geography

University of Cincinnati, Cincinnati, OH 45221

Parking: Stratford Heights Parking Garage $5 per day

2625 Clifton Ave, Cincinnati, OH 45220

Lecture instructors: Dr. Hongxing Liu, Dr. Richard Beck, Dr. Tom Stepinski

Lab instructors: Qiusheng Wu, Chris Carr, Elyse Allender, Jon-Paul McCool, Chantal Ivenso

Software packages: USGS Earth Explorer, Google Earth, Bing Maps, ArcGIS Explorer, ArcMap

Exercise data: on gissa2 server

Agenda

9:00-9:05 AM	Welcome remarks	Fred Judson
9:05-9:10 AM	Workshop arrangement	Dr. Liu
9:10-10:00 AM	Lecture #1: Introduction to Remote Sensing Imagery	Dr. Beck
10:00-10:10 AM	Coffee break	
10:10-11:00 AM	Ex #1: Search of satellite images, aerial photographs and digital elevation models through internet and enhancement and visualization of remote sensing imagery in ArcGIS Instructors: Qiusheng Wu, Chris Carr, Elyse Allender	
11:00-11:10 AM	Coffee break	
11:10-12:00 AM	Ex #2: Use camera photos, aerial photographs and satellite images in Google Earth, Microsoft VirtualEarth-Bing Maps, and share and distribute images via Google Earth. Instructors: Qiusheng Wu, Chris Carr	

12:00-1:30 PM	Lunch
1:30-2:20 PM	Lecture #2: Remote Sensing image processing and analysis Dr. Liu
2:20-2:30 AM	Coffee break
2:30-3:20 PM	Ex #3: Image analysis and feature extraction: image mosaicking, NDVI, pan-sharpening & shoreline extraction in ArcGIS Instructors: Qiusheng Wu Jon-Paul McCool, Elyse Allender
3:20-3:30 PM	Coffee break
3:30-4:30 PM	Ex #4: Supervised land cover classification using Landsat ETM+ imagery in ArcGIS Instructors: Qiusheng Wu, Jon-Paul McCool, Elyse Allender

Lecture #1: Introduction to Remote Sensing Imagery

Instructor: Dr. Beck

Time: 9:10-10:00 AM, Wednesday, November 7, 2012

Outline:

- Aerial photography vs satellite remote sensing
- The nature of digital remote sensing imagery
- Spatial, spectral and temporal resolutions of remote sensing imagery
- Types of remote sensing imagery and image format
- Interpretation of natural color and near infrared false color images
- Remote sensing data sources
- Color composition of multi-spectral imagery
- Basic contrast stretch methods for image enhancement
- Use of camera, aerial photographs, and satellite imagery in Google Earth
- Use of multi-angle high resolution aerial photographs with VirtualEarth Bird's-Eye View in Bing Maps
- Rich image databases provided by ArcGIS Explorer and ArcMap

Lecture #2: Remote sensing image processing and analysis

Instructor: Dr. Liu

Time: 1:30-2:20 PM, Wednesday, November 14, 2012

Outline:

- Satellite orbits and different types of sensors
- Past, current and future satellite remote sensing systems
- Image file structure and types
- Image map projection and coordinate system
- Image processing scenarios
- Handling imagery and raster data in ArcGIS
- Image pan-sharpening
- Calculation of vegetation index-NDVI
- Image feature extraction-threshold based segmentation
- Image classification methods

Workshop support materials

Lecture #1: Introduction to Remote Sensing Imagery (PDF)

Lecture #2: Remote Sensing image processing and analysis (PDF)

Ex #1: Ex #1: Search of satellite images, aerial photographs and digital elevation models through internet and enhancement and visualization of remote sensing imagery in ArcGIS (PDF)

Ex#1 data (zip)

Ex #2: Use camera photos, aerial photographs and satellite images in Google Earth, Microsoft VirtualEarth-Bing Maps, and share and distribute images via Google Earth. (PDF)

Ex#2 data (zip)

Ex #3: Image analysis and feature extraction: image mosaicking, NDVI, pan-sharpening & shoreline extraction in ArcGIS. (PDF)

Ex#3 data (zip)

Ex #4: Supervised land cover classification using Landsat ETM+ imagery in ArcGIS (PDF)

Ex#4 data (zip)

Imagery Data Sources

1) USGS EarthExplorer

(http://earthexplorer.usgs.gov)

2) Ohio state imagery data sources: OSIP

(http:/gis1.oit.ohio.gov/geodatadownload/osip.aspx)

3) NASA Satellite Data Search Engine:

(http://reverb.echo.nasa.gov/)

Online Learning Information Sources

Learn Google Earth: Your world in 3D-Zoom, Tilt and Rotate

Learn Google Earth: Historical Imagery

Learn Google Earth: Geotagging Photos

Learn Google Earth: Importing KML, KMZ and GPS Data

VirtualEarth Bing Maps: Feature Demo

VirtualEarth Bing map: Birds Eye Map View

How Satellites Work

Types of Satellite Orbits

Satellite Sensors (1957-present)

Types of Remote Sensing Instruments

Basics of Electromagnetic Spectrum

What is GIS