TUTORIALS FOR ENVI BY CATEGORY

http://www.itvis.com/ProductServices/ENVI/Tutorials.aspx

General ENVI Functionality

A Quick Start to ENVI
Brief introduction to the basic functions and graphical user interface of ENVI. Designed for new ENVI users.

Introduction to ENVI
A more comprehensive introduction to basic concepts and key features of ENVI. You should already be familiar with general image-processing concepts.

Introduction to ENVI Zoom
An introduction to basic concepts and key features of ENVI Zoom.

Interactive Display Functions
Introduction to ENVI's display functions and contrast enhancements, and suggestions for further investigating ENVI features. You should already be familiar with general image-processing concepts. New users should refer to the Quick Start or Introduction tutorials before starting this tutorial.

Classification Tools

Classification Methods
Introduction to classification methods using Landsat TM data from Cañon City, Colorado. Learn about unsupervised and supervised classification, post-classification processing (including clump, sieve, and combine classes), and accuracy assessment.

Decision Tree Classification
Introduction to ENVI's Decision Tree classifier. Run the classifier, explore display options, prune your decision tree, modify class characteristics resulting from the tree, and more.

Transform Tools

Landsat TM and SPOT Data Fusion
Introduction to selected ENVI data fusion methods. Learn about data stretching, pixel resizing, and manual and automatic hue-saturation-value (HSV) transforms.

Landsat TM and SAR Data Fusion

Map Tools

Image Georeferencing and Registration
Introduction to georeferencing and image registration in ENVI. Explore image-to-image and image-to-map registration, create image-maps, and perform image sharpening with multi-resolution data. You should already be familiar with general image registration and resampling concepts.

Georeferencing Images Using Input Geometry
In-depth discussion of georeferencing in ENVI, model-based geometric correction using input geometry, required data characteristics, and procedures for successful map registration.

Orthorectifying Aerial Photographs
Introduction to ENVI tools that orthorectify aerial photographs.

Orthorectifying Using Rational Polynomial Coefficients (RPCs)
In-depth discussion of orthorectification tools for IKONOS and QuickBird imagery that use RPCs often provided by the data vendors. Compare an orthorectified image to an uncorrected image, and examine changes produced by the orthorectification process.
Mosaicking in ENVI
Introduction to image mosaicking in ENVI. Pixel-based mosaicking demonstrates ENVI's Virtual Mosaic concept and simple mosaic tool. Georeferenced mosaicking demonstrates ENVI's automatic placement of georeferenced images and cutline feathering. You should already be familiar with basic mosaicking techniques.

Map Composition
In-depth discussion of ENVI's map composition tools. Use ENVI's QuickMap tool to create an image-map with virtual borders. Add a latitude/longitude grid, map key and scale, declination diagram, image inset, and text annotation.

Hyperspectral Tools

Introduction to Hyperspectral Data
Introduction to imaging spectrometry, hyperspectral images, and spectral processing in ENVI. Perform spatial and spectral browsing with AVIRIS data. Compare the results of several reflectance calibration procedures.

Basic Hyperspectral Analysis
Intermediate hyperspectral tutorial. Use AVIRIS data to extract ROIs for specific minerals, compare them to library spectra, and design color composites to best display the spectral information. Analyze 2D scatter plots to locate unique pixels, query the data distribution, and perform simple classification.

Selected Hyperspectral Mapping Methods
Advanced concepts for analyzing hyperspectral images in ENVI. Use AVIRIS data to investigate unique properties of hyperspectral data and how spectral information can be used to identify mineralogy. Perform Spectral Angle Mapper (SAM) classification. Compare apparent reflectance spectra with continuum-removed spectra. Perform Spectral Feature Fitting (SFF) and multi-range SFF, and compare results.

Target Finding With SAM and BandMax
Introduction to ENVI's SAM Target Finder with BandMax wizard. Use this wizard to differentiate planes from an image of a naval air station.

Using SMACC to Extract Endmembers
Introduction to ENVI's SMACC endmember extraction tool. Use this tool to extract endmembers from an image of a naval air station.

Advanced Hyperspectral Analysis
More advanced concepts and procedures for analyzing hyperspectral images in ENVI. Use AVIRIS data to investigate sub-pixel properties of hyperspectral data and learn advanced techniques for identifying and quantifying mineralogy. Review Matched Filter and Spectral Linear Unmixing techniques.

Hyperspectral Signatures and Spectral Resolution
Compare spectral resolution for several different sensors. Learn the effect of resolution on the ability to discriminate and identify materials with distinct spectral signatures. Compare spectra among Landsat TM, GEOSCAN, GER63, AVIRIS, and HyMap data, and compare to spectra from the USGS spectral library.

Geologic Hyperspectral Analysis
Using HyMap data from Cuprite, Nevada, as a starting point, learn the general methodology and tools to solve a general hyperspectral remote sensing problem. This tutorial does not include specific steps, only an overview of ENVI's hyperspectral processing flow and tools, and how to apply them to a geologic analysis. Refer to the series of hyperspectral tutorials (introductory through advanced) before attempting this tutorial.

Archaeology Hyperspectral Analysis
Using MIVIS data from Selinunte, Italy, as a starting point, learn the general methodology and tools to solve a general hyperspectral remote sensing problem. This tutorial does not include specific steps, only an overview of ENVI's hyperspectral processing flow and tools, and how to apply them to an archaeological analysis. Refer to the series of hyperspectral tutorials (introductory through advanced) before attempting this tutorial.

Vegetation Hyperspectral Analysis
Using HyMap data from Jasper Ridge, California, as a starting point, learn the general methodology and tools to solve a general hyperspectral remote sensing problem. This tutorial does not include specific steps, only an overview of ENVI's hyperspectral processing flow and tools, and how to apply them to a vegetation analysis. Refer to the series of hyperspectral tutorials (introductory through advanced) before attempting this tutorial.
Near-Shore Marine Hyperspectral Analysis

Using AVIRIS data from Moffett Field, California, as a starting point, learn the general methodology and tools to solve a general hyperspectral remote sensing problem. This tutorial does not include specific steps, only an overview of ENVI’s hyperspectral processing flow and tools, and how to apply them to a near-shore marine analysis. Refer to the series of hyperspectral tutorials (introductory through advanced) before attempting this tutorial.

Radar and Topographic Tools

Basic SAR Processing and Analysis

Introduction to ENVI’s tools for processing single-band synthetic aperture radar (SAR) data. Display RADARSAT data from Bonn, Germany. Perform contrast stretching and remove speckle using adaptive filters. Perform density slicing, edge enhancement, image sharpening, data fusion, and create an image map.

Polarimetric SAR Processing and Analysis

Introduction to ENVI’s tools for analyzing polarimetric radar data. Use SIR-C data to learn about multilooking, image synthesis from complex scattering matrix data, selection and display of polarization and/or multi-frequency images, slant-to-ground range conversion, adaptive filtering, and texture analysis.

TOPSAR Data and DEM Analysis

Display raw TOPSAR data and synthesize P- and L-band data. Examine polarization signatures and create a pedestal height image. For the TOPSAR DEM, generate and overlay elevation contours. Use ENVI’s X, Y, and arbitrary profiles (transects) to generate terrain profiles. View a 3D perspective of the DEM. Generate topographic modeling and feature images. (This tutorial replaces the previous "Topographic Tools" tutorial.)

3D SurfaceView and Fly-Through

Introduction to ENVI’s 3D SurfaceView and fly-through functions. Overlay an image over a DEM as a 3D surface view. Interactively change the 3D perspective and create 3D fly-throughs. Use the 3D SurfaceView function as an analysis tool.

DEM Extraction Add-On Module - Working With the DEM Extraction Wizard and Tools

This tutorial introduces the Digital Elevation Model (DEM) Extraction Module with functionality that enables you to extract elevation data from stereo imagery to create a DEM. A DEM is a raster grid of elevation values that represent a surface.

Programming in ENVI

Introduction to User Functions

Introduction to creating user functions and calling them from the ENVI menu system. Compile and run a simple Band Math user function, and learn how error-handling and tiling routines are incorporated into the user function. This tutorial assumes that you are familiar with the Interactive Data Language (IDL) and that you understand how to write functions and procedures in IDL. You must have ENVI+IDL to program in ENVI.

Introduction to ENVI Plot Functions

Plot functions are user functions that you can add to and call from the Plot_Function menu of any ENVI plot window. Learn how to create a simple plot function. Edit the ENVI useradd.txt file to include the plot function so that you can call it from a plot window menu bar. This tutorial assumes that you are familiar with the Interactive Data Language (IDL) and that you understand how to write functions and procedures in IDL. (You must have ENVI+IDL to program in ENVI; however, the plot functions provided with this tutorial can be viewed with any text editor and installed for use with either ENVI+IDL or ENVI.)

Vector Tools

Linear Feature Extraction with Intelligent Digitizer

This tutorial demonstrates how to use ENVI’s Intelligent Digitizer to extract linear features (such as roads, coastlines, lake boundaries, and rivers) as vector data.
Vector Overlay and GIS Analysis

Introduction to vector overlay and GIS analysis in ENVI. Perform stand-alone GIS analysis using ESRI shapefiles. Learn about vector windows, viewing and editing attribute data, point-and-click spatial query, and math/logical query operations. Overlay vectors on images, and perform heads-up digitizing and vector layer editing. Generate new vector layers using math/logical query operations and raster-to-vector conversion of ENVI regions of interest (ROIs) or classification images. Perform vector-to-raster conversion, using vector query results to generate ROIs for extraction of image statistics and area calculations. You should already be familiar with basic GIS analysis concepts.

Miscellaneous

Working with NITF Data

This tutorial introduces common tasks when working with National Imagery Transmission Format (NITF) files. Exercises include opening multiple image segment files, viewing NITF metadata, working with TREs and DESes, chipping, and saving NITF files. You will also learn how RPC map information is used in NITF files.

ENVI Feature Extraction with Rule-Based Classification

This tutorial shows you how to use ENVI Feature Extraction to extract rooftops from a QuickBird scene. You will learn how various attributes can help you build meaningful rules in classification. Finally, you will export your classification results to a shapefile.

ENVI Feature Extraction with Supervised Classification

This tutorial shows you how to use ENVI Feature Extraction to extract impervious surfaces from a QuickBird scene using supervised classification. You will learn how to smooth your vector results and save the output to a polygon shapefile. Note: Use this corrected training data file. Note: Please use this corrected training data file.

Multispectral Analysis of MASTER HDF Data

Introduction to the Hierarchical Data Format and analysis of multispectral imagery from the MODIS/ASTER Airborne Simulator (MASTER) sensor. Open and read HDF files, and process shortwave infrared (SWIR) and longwave infrared (LWIR) data.

Vegetation Analysis Toolkit

This tutorial introduces Vegetation Analysis using ENVI. ENVI includes a suite of tools designed to help you determine the overall state of different vegetation types from their reflectance properties. The application-specific vegetation analysis tools in ENVI classify the scene for vegetation analysis specific to agricultural stress, fire fuel distribution, and overall forest health. This method enables you to perform vegetation analysis using tools that guide index selections for a specific outcome.

FLAASH Add-On Module - Atmospherically Correcting Hyperspectral Data Using the FLAASH Module

This tutorial provides an introduction to using FLAASH to atmospherically correct a hyperspectral image. You will display the radiance image, apply an atmospheric correction, and examine the results.

FLAASH Add-On Module - Atmospherically Correcting Multispectral Data Using the FLAASH Module

This tutorial provides an introduction to using FLAASH to atmospherically correct a Landsat 7 ETM+ data set. You will display the radiance image, apply an atmospheric correction, and examine the results.

FLAASH Add-On Module – Preparing ASTER Data for Input Into the FLAASH Module

This tutorial describes how to prepare ASTER Level 1A and Level 1B radiance data for input into the FLAASH Module.