



# IMAGINE Professional<sup>®</sup> PRODUCT DESCRIPTION

# IMAGINE Professional

## Product Description

IMAGINE Professional® provides a comprehensive geographic imaging package for advanced image processing, remote sensing and GIS professionals. All the capabilities of IMAGINE Essentials® and IMAGINE Advantage® are found in IMAGINE Professional, as are advanced features such as graphical data modeling, advanced classification and radar analysis tools. ERDAS IMAGINE® is one of the first commercial software packages to allow users to create expert systems that use geographic data to solve geographic problems. With the IMAGINE Expert Classifier™, IMAGINE Professional users have a tool for building and executing expert systems for image classification, post classification refinement and advanced GIS modeling. For complete information on all of the capabilities and features available in IMAGINE Professional, please also review the IMAGINE Essentials and IMAGINE Advantage Product Descriptions.

## Key Features

**Spectral Analysis** - Any user with access to hyperspectral imagery from which they wish to quickly extract material mapping information with the minimum of user interaction (and without the need for costly training in hyperspectral image processing theory) can benefit from the new Spectral Analysis tools:

- Standard task-based workflows
  - Anomaly Detection
  - Target Detection
  - Material Mapping
  - Material Identification
- Hyperspectral image preprocessing steps
  - Band wavelength/width specification
  - Bad band identification
  - Spectral subset
  - Spatial subset
  - Atmospheric Adjustment
  - Minimum Noise Fraction
- Spectral libraries provided
  - ASTER
  - JPL
  - USGS
  - Import new versions of the above libraries
  - Import SITAC libraries
  - Import SPECMIN libraries
- Spectral Analysis Workstation
  - Multi-pane workspace providing access to all the tools, functionalities and viewers for interactively analyzing hyperspectral imagery, spectral signatures and other data displays
  - Three geospatially-linked views (main view, an overview view of the whole image extent and a zoom view showing magnified detail of a specific location)
  - Embedded Spectral Plot tools
  - Embedded Spectral Libraries
  - Drag and drop interaction between the image pixels, plots and libraries
  - Access to all preprocessing and task processes
- Spectral Analysis Methodologies
  - Orthogonal Subspace Projection (OSP)
  - Spectral Angle Mapper (SAM)
  - Spectral Correlation Mapper (SCM)
  - Constrained Energy Minimization (CEM)

**IMAGINE Expert Classifier** - The IMAGINE Expert Classifier is made up of two components: the Knowledge Engineer and the Knowledge Classifier.

Key features of the Knowledge Engineer include:

- Build a knowledge base using a graphical drag-and-drop interface
- Confidence value definition and propagation—the ability to handle uncertainty
- The ability to use variables from various sources including images, vectors, scalars, graphical models and other user-defined programs
- The ability to include prompts for particular data files for the creation of portable knowledge bases
- Quick feedback on the results of a classification to aid in developing and fine-tuning a knowledge base
- Access to other ERDAS IMAGINE tools, such as Model Maker, for defining spectral/spatial operators

The Knowledge Classifier enables users to apply a knowledge base to geographic data with the simple user-friendly Knowledge Classifier wizard interface.

- Perform classifications
- Evaluate classification classes
- Automatically identify missing files
- Output fuzzy sets, confidence layers and feedback layers, as well as classifications

While the Knowledge Engineer is a standard part of IMAGINE Professional, the Knowledge Classifier is a standard part of IMAGINE Advantage. Consequently, expert users who design and test knowledge bases using IMAGINE Professional can distribute them to IMAGINE Advantage users anywhere in the world to apply the classification process to their data.

#### **Multispectral Classification**

- Fuzzy classification
- Fuzzy convolution filtering
- Unsupervised classification
  - ISODATA algorithm
  - Initialize class means from image statistics or optional signature file means
  - Set convergence threshold, maximum iterations and skip factors
  - Classify only the AOI
  - Output a signature set
  - Specify the number of classes and color scheme in the output cluster file
- Grouping Tool for assigning classes to land cover types
  - Define target land cover classes
  - Interactively select and highlight working groups of classes
  - Boolean operators to compare and separate working groups
  - Highlight similarity/conflict geographically
  - Dendrogram Tool visually represents similarity of classes
    - Distance Measures
      - Euclidean
      - Mean Scaled
      - Divergence
      - Spectral Angle
    - Agglomeration Methods
      - Simple linkage
      - Complete Linkage
      - Simple Average Linkage
      - Average Linkage
      - Centroid
      - Median
      - Save grouped classes to image
- Fuzzy recode

- Accuracy Assessment through use of ancillary data to measure errors of commission/omission
- Post-classification class editing
  - Chi-square or Euclidean distance class thresholding
  - Threshold interactively on a histogram display
  - Threshold based on statistics or graphic editing
  - Preview threshold results
- Classification accuracy assessment
  - Random or user-defined ground truth locations
  - Automatically generate accuracy reports with Kappa statistics, error matrices and accuracy totals
- Supervised classification
  - Control of automatically generated statistical attribute fields in an output classified file
  - Output a distance file for use in thresholding
  - Control the classification
    - Non-parametric signatures may be ignored or classified by parallelepiped limits or feature space masking
    - Pixel overlap rule
      - By parametric rule
      - Classify by order
      - Leave unclassified
    - Unclassified pixels: evaluate by parametric rule or leave unclassified
    - Parametric signatures evaluated by maximum likelihood, mahalanobis distance, parallelepiped or minimum distance rules
    - Hybrid parametric/non-parametric classification
  - Select, evaluate and edit signatures
    - Signature creation
      - Automatic region growing
      - Selected vector objects
      - User-defined AOI point, ellipse, rectangle, polygon or polyline objects
  - Sophisticated feature-space signature editing, extraction and evaluation
  - Signature evaluation and manipulation
    - Contingency matrices
    - Separability measures
      - Euclidean
      - Divergence
      - Transformed divergence
      - Jefferies-Matusita
      - User-specified bands per combination
  - Image alarm, including overlap indication
  - Mean per band or histogram plots
  - Univariate and covariance statistics
  - Feature space (scattergram) plotting
    - User-specified band combinations
    - Signature ellipse plotting
    - Image to feature space linking
    - Non-parametric signature extraction
  - Signature merge, delete and replace
  - Set layers to use in classification process
  - Manual editing of parallelepiped limits
  - Set output class values, colors, a priori probabilities and classification order

**Subpixel Classification** – The IMAGINE Subpixel Classifier characterizes the scene being processed by the amount (fraction) of one specific material, rather than n materials, in each image pixel. This allows the classification objects smaller than the spatial resolution of the sensor

- Train the classifier
- Perform environmental corrections
- Develop Training Signatures
- Combine Signatures

- Perform Quality Assurance

**Area Frame Sampling** – A Statistical approach to estimating land cover extent within a given region, based on interpretation of higher resolution imagery samples

- Project manager and wizard
- Stratum file definition
- Sampling grid generation
- Graphical sample selection
- Dot grid analysis to label samples
- Polygon analysis to label samples
- Calculate estimates and error tolerances

**Model Maker** - An object-based graphical tool for the rapid definition of integrated raster and vector data analyses and spatial modeling.

- Based on Spatial Modeler Language (SML)
- Over 50 prepackaged models
- Use graphical flow charts to quickly perform sophisticated GIS analysis
- Combine GIS and image processing functions in the same spatial model
- Combine raster, vector and attribute data in a single model
- Apply a model to new data or a different geographical area at the push of a button
- Double-click to define objects
- Function object
  - Access to over 200 separate functions
  - Function syntax “prototypes”
  - Use and output attribute information
- Set operating geographic window and resolution
- Accepts calibrated images
- Re-project input data on-the-fly
- Cut, copy and paste objects
- Quickly modify and re-run the model
- Run a model directly or generate an SML script for integration with EML

**Create ECW Images** – A fast compression and de-compression data format which maintains image quality at very high compression levels.

#### **IMAGINE Radar Interpreter™**

- Sensor merge
  - Principal components
  - Intensity Hue Saturation (IHS)
  - Multiplicative
  - Radar data re-map options
- Texture enhancement
  - Variance
  - Skewness
  - Kurtosis
  - Mean Euclidean distance
- Speckle suppression
  - Mean
  - Median
  - Lee-Sigma
  - Local region
  - Lee
  - Frost
  - Gamma-MAP
- Edge enhancement

- Wallis adaptive filter
  - Bandwise, IHS or Principal Component
  - User-defined scene contrast multiplier
- Luminance modification
  - Produce undegraded, high-luminance or low-luminance image
  - Specify local luminance intercept
  - Normalize illumination in the range direction
  - User-defined scene contrast multiplier
  - Correct illuminance in row or column
- Slant-to-ground range adjustment
  - Specify sensor
    - Depression angle
    - Beam width
    - Elevation
  - Adjust to flat plain or user-defined spheroid
  - User-defined output resolution
- Radar Conversions
  - Domain
    - Magnitude and Phase (MP)
    - Intensity and Phase
    - Real and Imaginary (IQ)
    - Magnitude Only (M)
    - Intensity Only
    - Phase Only (P)
  - Radiometric
    - Media DN to Beta-Naught (Linear)
    - Media DN to Beta-Naught (Decibels)
    - Linear to Decibels
    - Decibels to Linear
- Radiometric Terrain Correction, producing
  - Radar backscatter coefficient Sigma-Naught
  - Incidence angle mask

## About ERDAS

ERDAS – The Earth to Business Company – helps organizations harness the information of the changing earth for greater advantage.

ERDAS creates geospatial business systems that transform our earth's data into business information, enabling individuals, businesses and public agencies to quickly access, manage, process and share that information from anywhere.

Using secure geospatial information, ERDAS solutions improve employee, customer and partner visibility to information, enabling them to respond faster and collaborate better. It also means better decision-making, increased productivity and new revenue streams.

ERDAS is a part of the Hexagon Group, Sweden. For more information about ERDAS or its products and services, please call +1 770 776 3400, toll free +1 866 534 2286, or visit [www.erdas.com](http://www.erdas.com).

