

Welcome to the state-of-the-art technology, developed for preliminary and thematic processing of satellite images, for the creation of value-added products based on the Earth data from space (maps, physical indices, models), and for exporting data into GIS and other image processing systems.

It is hard to imagine modern human activities without using precise, independent and recurrently updated information. Satellite-based imagery is the source of such information. Nowadays we are witnessing more and more practical tasks being resolved with the help of remote sensing data.

Many people understand the potential of the new technology and would like to start using it, however they often run into inaccessibility and high prices of the required data. These constraints are also true with respect to space images processing software.

ScanEx R&D Center always tried to be user-friendly. We hereby offer ScanEx Image Processor® software, which is a unique one in its combination of tools, quality and price. We keep abreast of all the contemporary developments, therefore we took into account the experience of the world leading software producers when developing the software in subject.

SPECIAL FEATURES

ScanEx Image Processor® Microsoft® Windows®-based application is designed to process the satellite and aerial photo survey of the Earth. The program tools package enables to resolve a wide range of tasks: from preliminary images processing to thematic analysis and getting final thematic products.

The program consists of the basic configuration and add-on modules, such as:

- classification and thematic interpretation of multispectral images;
- 3D modeling and visualization;
- terrain analysis;
- radar images thematic processing;
- hydrological modeling;
- software development kit (SDK).

Software modular structure is designed to be convenient for end-users: it is always important to have a choice, so that you can obtain only the set of tools that you need for your research work.

FUNCTIONAL CAPABILITIES

Raster importing/exporting

- Import of more than 20 graphic formats, including the conventional ones used by the remote sensing programs, as well as possibility to load RAW images.
- DEM import in Surfer GRID, ARCINFO ASCII GRID, USGS DEM formats.
- Import/export of the images with the value range from 8 to 64 bit per pixel.
- Export to popular graphical and conventional formats, with the possibility of saving accompanying geo-reference files (ESRI World File and MapInfo TAB File).
- Possibility of converting the brightness band into the indicated dynamic band, saving coefficients for the reverse conversion.
- Export of images, saving adjusted color, gamma correction and contrast parameters.

Raster visualization

- RGB and Grey presentation possibilities.
- Presentation in form of uninterrupted gradient palette, including palette generation, edition and re-use assets.
- Presentation in index colors, including creation, edition and comments introduction assets for each color legend category.
- Image automatic and manual contrasting, gamma correction and color balance correction.
- Display of more than 20 RGB layers in one view window.
- Select re-sampling filter for displaying.
- Navigation window display capability.

Raster geometric correction

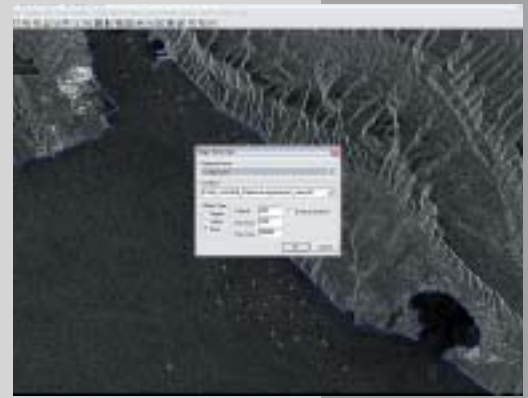
- Systematic correction, without additional assets, for the following types of data (EROS-A, RADARSAT-1, IRS-1C/1D, IRS-P5/P6, SPOT-2/4, Meteor-3M, TERRA-ASTER, TERRA/AQUA-MODIS, NOAA satellites, Resource satellites : MSU-E/MSU-SK).
- Satellite model and positioning verification.
- Registration of none geo-referenced images.
- Ortho-transformation of images using GCP, with due account of territory heights.
- Classic polynomial transformations up to 5th power.
- Rational polynomial transformations up to 5th power.
- Simple polynomial transformations up to 5th power.
- GCP setting in manual mode, in raster to vector layer and raster to raster modes.
- Transformation model accuracy estimation.
- Images local errors correction.
- Automatic co-registration of images.
- Data reprojection from different coordinates systems into the specified one.
- Support of over 26 types of map projections, of more than 60 coordinates systems and over 50 reference-ellipsoids.

Image filtration

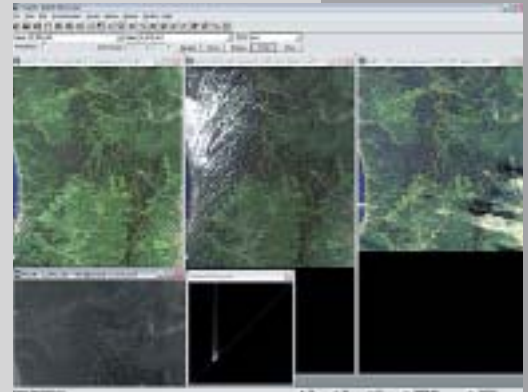
- Median filters.
- Convolution filters.
- Edge Detection.
- Smooth filters.
- Speckle Noise filtering.
- Morphological operations.
- Texture features calculation.
- Noise removal.
- Values interpolation.

Images radiometric processing

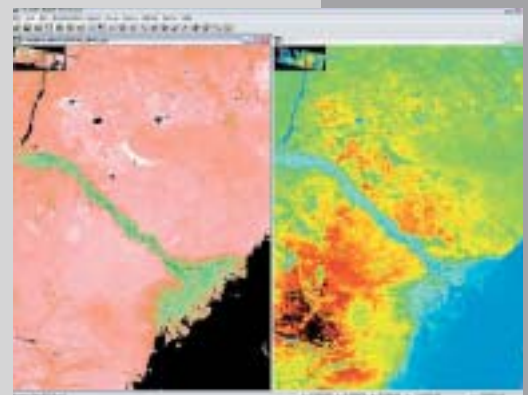
- Radiometric correction of TERRA-ASTER and IRS-1C/1D data.
- Image histogram matching.
- Image contrast alignment.
- Histogram stretch.



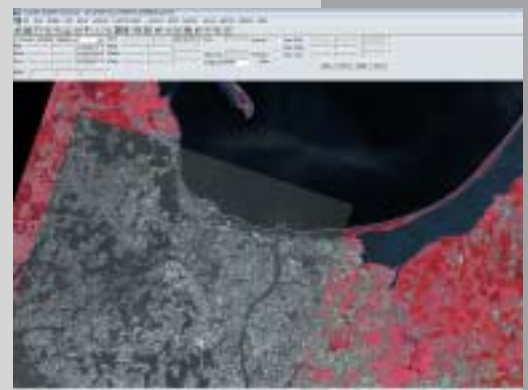
Radar images thematic processing — Ship Detection



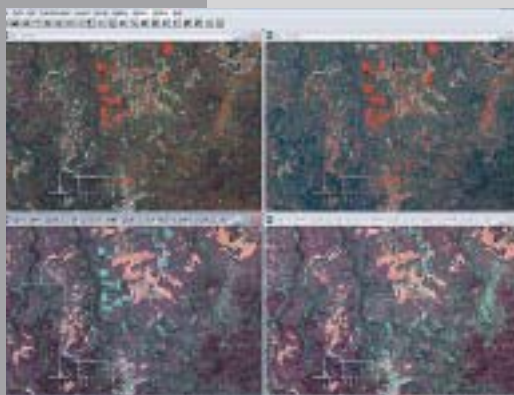
Interactive color-balanced mosaicking



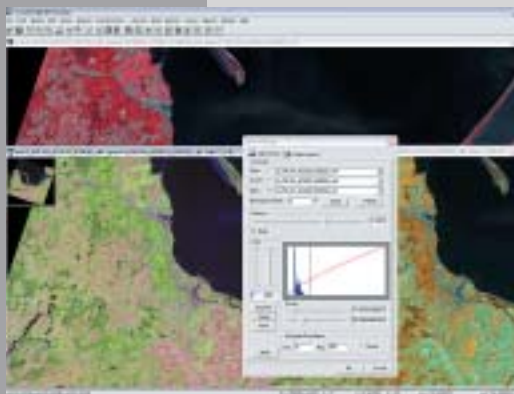
MODIS data thematic products



Raster geometric correction



Area time history — Change Detection algorithms



Raster visualization



Spatial resolution enhancement



3D modeling and visualization

Spectral enhancement

- Brightness re-calculation in Radiance/Reflectance.
- PCA direct and reverse transformation.
- RGB and HIS planes direct and reverse transformation.
- Linear and non-parametric regression calculation.
- False color to natural color transformation, panchromatic channel fusion.

User image processing algorithms

- Possibility to write own processing algorithms using over 40 in-built functions and operators.
- Capability to save macros for repeated use.
- Setting macros, created by the users, in form of program dialogs called out from the main menu.

Interactive color-balanced mosaicking

- Automatic and manual contrasting.
- Capability to use all image or image fragment within a vector mask.
- Possibility to use seamlessly mosaicked images.

Spatial resolution enhancement

- PCA+Wavelet algorithm, enabling to get better results from the new generation data (Landsat 7, IKONOS, QuickBird) unlike traditional methods.
- Traditional algorithms (PCA transformation, HIS transformation, arithmetic transformations – Brovey Transform and Multiplicative).

Change Detection algorithms

- Traditional algorithms – “subtraction” and “division”.
- PCA algorithm.

Atmospheric correction

- Multispectral images haze compensation.

Working with image fragment

- Image processing within the vector area and the preset rectangular area.
- Possibility to set working area extent.
- Segmentation of images by preset sizes.

MODIS data thematic products

- Fire detection.
- Clouds detection.
- Snow and ice cover detection.
- Land surface temperature calculation.
- NDVI and EVI calculation.
- Possibility to set threshold values during calculation.

Vector layers editing

- Support of vector data in ESRI SHP and Mapinfo MIF formats.
- Support of different vector layers display styles.
- Generation of new vector layers.
- Vector editing (arcs and joints editing, morphological operations with polygonal objects).
- Attributive information editing.
- Reprojection into preset coordinates system.
- Automatic vectorization within the specified brightness value and range.
- Vector rasterization.

Terrain analysis

- Possibility of package loading, correction and reprojection of SRTM and GTOPO30 data from the indicated source, initial data can be stored in archive mode.
- Hydrologically correct DEM generation module from vector.
- DEM generation from stereo images.
- Vertical and horizontal gradient.
- Ewans terrain classification.

Thematic processing of radar images

- Radar images segmentation using specific algorithms.
- Possibility to account for images texture properties.
- Results thematic calibration using references.
- Generation of thematic raster maps.
- Automatic vectorization.
- Oil spills detection.
- Possibility to get statistic probability of assessing the pixel as oil spill.
- Possibility of automatic vectorization of processed data.
- Ship detection.

Thematic processing of multispectral images

- Multispectral images segmentation using specific algorithms.
- Possibility to account for images texture properties.
- Results thematic calibration using references.
- Generation of thematic raster maps.
- Automatic vectorization.

Solar radiation balance calculation

- Capability to calculate short-wave radiation.
- Capability to calculate long-wave radiation.
- Capability to calculate air and surface temperatures.

Hydrological modeling

- Possibility to model hydrograph.
- Flooding modeling.
- Freshets and overflows modeling.
- Acquisition of water distribution model on the specified date.
- Visual assessment possibility.

3D modeling and visualization

- 3D landscape modeling.
- Modeling in different details.
- Real-time display of generated 3D landscape models.
- Vector layers draping.
- Additional raster thematic layers draping.
- Cloudiness, fogs, mists, smoke modeling.
- Water surface modeling.
- Trees modeling.
- Texture use possibilities.
- 3D models importing in 3D Studio MAX formats.
- Video-clips recording possibility.

SDK

- Possibility to work with the image as with matrix.
- Use of over 40 standard mathematic functions, operators and filters.
- Stereo processing possibility.
- Radiometric correction.
- Scripts creation possibilities.
- Possibility to create user interface (GUI) for scripts, with access to the created scripts via main program menu.

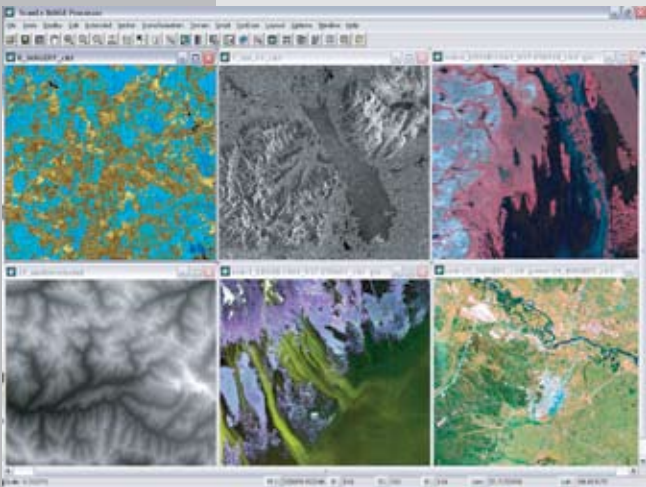
Layout

- Mock-up control assets (paper size, dpi).
- Grade and metric grid drawing possibility.
- Use of legends for thematic raster presentations.
- Prepared mock-up export in TIFF format for further printing in other programs.

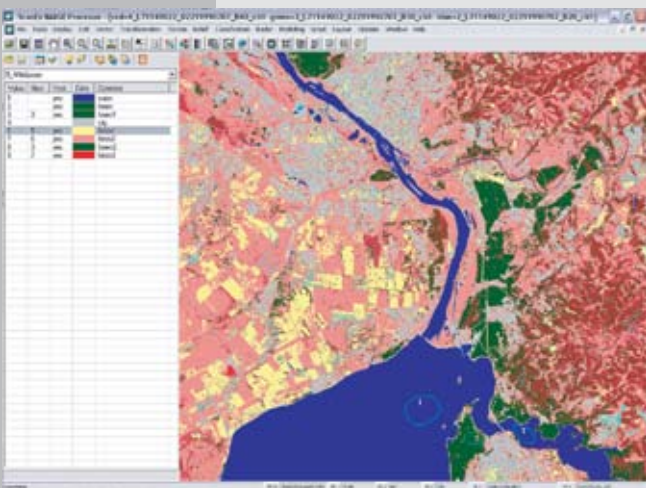
Minimum system requirements:

- Intel Pentium 4 or higher.
- RAM 512 Mb.
- 40 Gb of hard disk free space.
- Monitor 1024x768 True Color.
- ATI Radeon or Nvidia GeForce video card.
- MS Windows 2000/XP or later versions.

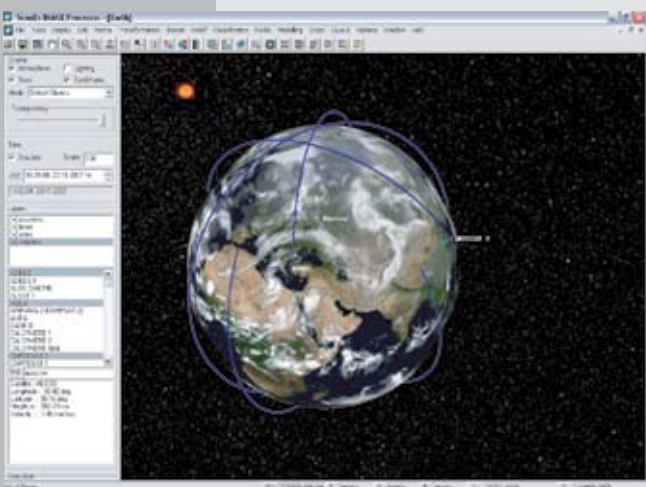
New possibilities of ScanEx Image Processor



Batch processing of images



Supervised classification algorithm based on forward-propagation neural network



Global 3D model of the Earth with satellite tracks

Raster data batch processing

- Possibility to do batch processing with systematic geometric correction, data re-projection, re-formatting, etc.

Raster data importing/exporting

- Saving "user's projection"
- Quick data loading without pyramid layers computation

Raster data visualization

- Raster layers transparency feature
- Raster layer display within a vector mask
- Saving display parameters settings in external file
- Additional tools of intensity and contrast control

Raster data geometric correction

- Strict models added for SPOT-2,4,5, RESOURCESAT (IRS-P6), CARTOSAT-1,2, EROS-B, FORMOSAT-2 satellites data
- Verification of RPC-model based on ground control points for GeoOrthoKit, QuickBird and NITF formats (support of data acquired from ALOS, RapidEye, WorldView, GeoEye satellites)
- Using a model of different data models for matrix of vertices in polynomial transformations during image orthorectification
- Vector layers geometric correction using control points
- Operations with control points in any coordinate system
- Support of connecting points

Raster images classification

- Unsupervised ISODATA classification algorithm with the option to use vector masks as region borders for teaching
- Supervised classification algorithm based on forward-propagation neural network
- Possibility to do raster sampling saving the results into the vector layer's table of attributes

Building 3D Earth model

- Creation of global 3D model of the Earth
- Overlaying vector layers on 3D model. Toponymic search
- Satellite tracks display using NORAD data
- Modeling of Earth and other solar system planets rotation, as well as of Earth insolation and atmosphere
- Possibility to switch from global model to local 3D raster models
- Video clips recording

3D modeling and visualization

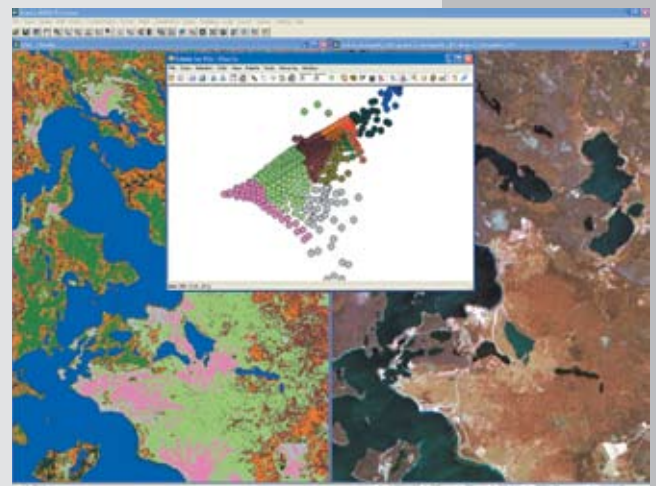
- Possibility to quickly create standard 3D objects based on vector map's outlined objects using textures
- Creation of "roads" using oriented textures and vector layers
- Interactive editing of created 3D objects
- Easy plotting of simple vector primitives (polylines, points, regions) onto 3D model
- Operations with attributive data saved in 3D vector objects' database
- Enhanced toolkit for navigation and control
- Possibility to use vector layer and GPS-receiver data exported in it as satellite camera flyby trajectory or a 3D object
- Free application for 3D models viewing



Creation of 3Dz interactive model

«Thematic Pro» thematic interpretation

- Object-oriented classification and thematic interpretation of multispectral imagery
- Possibility to take into account objects' geometry during segmentation
- Interactive thematic classification with teacher for segmentation results
- Segmentation results classification using discriminant analysis
- Using pixel and object data for image classification
- Activation of enhanced neural network algorithm of thematic classification and interpretation and its usage in GTM algorithm
- Operations with intuitive structure of classes of spatial objects, based on Sammon's mapping
- Possibility of teaching neural network within model samplings
- Different post-processing algorithms (generalization, sampling, Markov fields, etc.)
- Operations with hierarchy structure of spatial data
- Creation of hierarchy structure of storing interpretation results



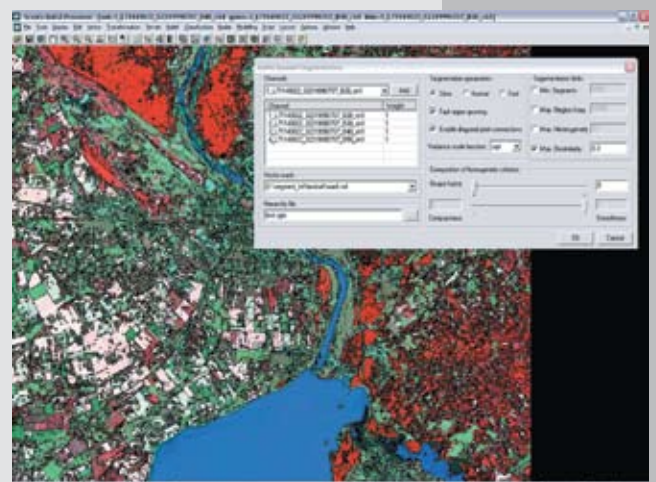
Neural network classification and GTM algorithm

Interactive generation of color-balanced mosaics

- Creation of mosaics for large territories
- Possibility of non-linear color balancing

Processing of radar images

- Possibility to take into account objects' geometry during segmentation
- Interactive thematic classification with teacher for segmentation results
- Segmentation results classification using discriminant analysis



Object-oriented classification of multispectral imagery