Overview

Stereo Analyst® is a Windows-based solution for the collection, interpretation and visualization of 3D geographic information from imagery. Using accurate geographic imagery, Stereo Analyst transforms your 2D GIS into real-world dimensions with 3D information.

Stereo Analyst updates your GIS by superimposing existing 2D vector layers onto a digital stereo model (DSM) and then editing and reshaping them to their accurate, real-world positions. During the collection of GIS data, the spatial and non-spatial attribute information associated with a GIS layer can be edited, and the attribute tables can be displayed with the DSM. Automated attribution techniques simultaneously populate a GIS during the collection of 3D data (i.e., area, perimeter and elevation of a parcel of land). Additional qualitative and quantitative attribution information for a feature can also be input during the collection process.
**Key Differentiators**

With Stereo Analyst, you can:

- Collect true, real-world 3D GIS data in one simple step, to higher accuracies than when using raw imagery, geo-corrected imagery or orthophotos
- Utilize time-saving, semi-automated feature collection tools for collecting roads, buildings and parcels
- Collect 3D information from any type of camera, including aerial, digital, video and amateur
- Automatically attribute spatial geographic information
- Verify the accuracy of existing GIS vectors and digital stereo models
- Directly output, and immediately use, ESRI 3D Shapefiles in ERDAS IMAGINE® and ESRI GIS products
- Easily transform 2D Shapefiles to 3D Shapefiles
- Simultaneously view 3D GIS in stereo and in a 3D perspective window.

**Key Features**

**Interactive Stereo Viewing and Interpretation**

Stereo Analyst provides unparalleled image handling for the display and manipulation of 3D digital stereo models.

- OpenGL and stereo-in-a-window
- Various 3D digitizing pucks supported
- The following components are supported within one user interface. Each interface component can be resized, opened and closed at any given time, thus providing optimum management of the Stereo Analyst workspace environment.
  - Overview stereo window
  - Primary stereo window
  - Left and right monoscopic window (for the display of the left and right images comprising a stereo pair)
  - Feature class palette containing all of the features to be collected or updated
  - Feature attribute tables
  - Feature collection and editing tools
  - 3D Measure tool and 3D Position tool
  - 3D Perspective view to visualize 3D models with automated image texture capabilities included
- Supports anaglyph stereo and hardware stereo (i.e., stereo emitter, glasses and stereo graphics card)

- Supports a 3D floating cursor/mark
- Adjust X and Y parallax
- Adjust the elevation of the 3D floating cursor
- Individually manipulate the left and right images comprising a stereo pair
- Supports image rotation
- Band combinations can be adjusted for color and multi-spectral imagery
- Hierarchical pyramid layers are used to facilitate increase the speed of image handling
- User preferences and options can be set per user and remembered during work sessions
- Continuous zooming
- Automatic panning
- Image roaming
- Fixed cursor mode
- Automated terrain following cursor
- Graphically select digital stereo models from IMAGINE OrthoBASE® block files
- Sensor Support for IKONOS, SPOT and IRS-1C
- Adjust the color, size and shape of the 3D floating mark
- Image enhancement capabilities include:
  - Image data scaling
  - Brightness and contrast adjustment
  - Histogram equalization, standard deviation stretch, linear stretch, Gaussian stretch and many more
  - Piecewise contrast adjustment
**Image Data Sources**

Stereo Analyst supports:

- Standard aerial photography (black & white or color)
- 35mm amateur photography
- Medium and large format photography
- Digital cameras using a charge coupled device (CCD)
- Video cameras using film or CCD
- Archived historical photography
- Photography scanned using a desktop scanner
- The following raster DLLs are supported, eliminating the need for image import: tif, gif, jpeg, generic binary, raw binary, MrSID, and ERDAS IMAGINE LAN and IMG
- The sensor model properties of IMAGINE OrthoBASE block files can be previewed

**Create Digital Stereo Models**

Stereo Analyst supports the creation of various types of digital stereo models. DSMs can be obtained from the following sources:

- Two overlapping images can be leveled, scaled, rotated and translated to create a relative stereo pair. A relative stereo pair contains 3D coordinates referenced to an arbitrary model space coordinate system. A relative stereo pair is referred to as a non-oriented stereo model.
- The Create Stereo Model tool creates accurate DSMs using the following sensor model and image information.
  - Two overlapping image files
  - Projection, spheroid and datum
  - Linear and angular units
  - Average flying height (optional)
  - Photographic direction (aerial, terrestrial or oblique imagery)
  - Rotation system
  - Camera calibration information (i.e., focal length, principal point, lens distortion, etc.)
  - Interior orientation coefficients (i.e., affine transform parameters for each image)
  - Exterior orientation parameters for each image, including X, Y, Z, omega, phi and kappa
- External aerial triangulation results from other softcopy photogrammetric systems can be used to create oriented stereo pairs (ASCII STP files). The following information is required to create an STP file:
  - Two epipolar resampled images
  - Projection
  - Linear and angular units
  - Rotation system
  - Average flying height
  - Focal length
  - Six interior orientation coefficients (i.e., affine transform parameters for each image)
  - Exterior orientation parameters for each image, including X, Y, Z, omega, phi and kappa
- IMAGINE OrthoBASE is the primary sensor modeling engine that determines the necessary information required to automatically create and display DSMs on-the-fly within Stereo Analyst. Hundreds of overlapping images can be processed simultaneously to create an IMAGINE OrthoBASE block file. Stereo Analyst utilizes the accurate sensor model information to automatically rotate, level and scale the overlapping images, thus providing a clear digital stereo model for comfortable stereo viewing.

**3D Measure Tool**

The 3D Measure tool is an effective aid for air photo interpretation and quantitative analysis of geographic information. For example, the area boundary of a forest stand or a parcel of land can be delineated and measured directly in 3D.

The 3D Measure tool is advantageous for collecting information in specific geographic areas where a field survey has not been performed and where automated elevation extraction techniques fail. Such areas include floodplains, drainage networks, dense urban areas, forested areas, road and highway networks, and bridges. Using Stereo Analyst, the following highly accurate, real-world 3D measurements can be collected in an office environment:

- 3D coordinates of a point
- Length, slope and azimuth of a line
- Difference in elevation (Delta Z) between the start and end point of a line
- Area and perimeter of a polygon
• Angle between three points in a polyline or polygon
• Average elevation value in a polyline or polygon

The resulting measurement information can be saved as an ASCII file for use in subsequent GIS analyses and applications.

3D Position Tool

The 3D Position tool is an effective aid for determining the accuracy of existing GIS vector datasets and DSMs. It is also the ideal tool for performing GIS data quality assurance (QA) and quality control (QC).

• Enter 3D check points to determine the accuracy of digital stereo models and GIS vector layers
• Set the appropriate zoom level for viewing and accuracy validation
• Compare the displayed 3D check point positions to the original check point coordinates
• Quantify the accuracy associated with DSMs and GIS vector layers

The 3D Position tool can also be used to collect 3D point positions for use in other applications. The resulting 3D point positions can be used for geocorrection, orthorectification, or highly accurate point determination.

GIS Data Input and Output

Existing feature datasets can be imported and subsequently exported for use in other software packages and applications.

• Convert 2D Shapefiles to 3D Shapefiles
• Specify a DEM or constant elevation value as a vertical reference source
• Import and export existing GIS datasets using the flexible ASCII import capabilities
• Export Stereo Analyst feature projects into descriptive ASCII text files
• Export 3D Shapefiles to 2D Shapefiles

3D GIS Feature Collection

Stereo Analyst allows for the accurate collection of GIS data in 3D. Feature collection tools are provided to facilitate and automate the process of collecting accurate, real-world GIS data.

• Directly collect and store 3D GIS data as ESRI 3D Shapefiles
• Collect and represent geographic features, such as:
  - Point features (i.e., utility poles)
  - Multi Point features (i.e., multiple traffic signs)
  - Polyline features (i.e., roads, rivers, city boundaries)
  - Polygon features (i.e., parcels of land, buildings)
• Use the 3D floating cursor to accurately identify and collect 3D GIS data. During feature collection, the elevation of the 3D floating cursor can be accurately adjusted to rest on the feature being collected.
• Stream Mode digitizing allows for the continuous collection of a polyline or polygon feature, without the continuous selection of feature vertices
• The Right Angle Snap tool ensures that line segments associated with polyline and polygon features are collected either 90, 180, 270 or 360 degrees relative to one another
• The Polygon Close tool provides a semi-automated collection capability for digitizing four-sided polygon features
• The Parallel Polyline tool allows for the simultaneous collection of parallel polyline features (i.e., roads, rivers)
• The 3D coordinates of each vertex collected can be displayed within the attribute tables

GIS Data Update and Editing

Existing GIS data can be edited to create updated representations of the Earth and its associated geography. Feature snapping in 2D and 3D allows for the accurate placement of the 3D floating cursor for GIS vector edits and updates.

The following feature editing tools are provided:

• Reshape
  - Move Vertices — The ability to move the XY position of a vertex
  - Delete Vertices — The ability to delete individual vertices, or a group of vertices
  - Add Vertices — The ability to add new vertices to an existing feature
  - Adjust Elevation of Vertices — The ability to edit the elevation of existing vertices
• Extend Polyline — Add additional vertices to the beginning or end portion of an existing polyline feature
• Remove Line Segment — Remove a line segment associated with a polyline feature
**GIS Feature Data Customization**

Customized feature datasets can be created for subsequent feature collection and attribution. Stereo Analyst provides the following feature customization options:

- Create point, multiple point, polyline or polygon feature classes
- Define:
  - Feature class name, file name and description
  - Feature class icon
  - Feature class color and border color
  - Opacity level
  - Unlimited attribute specification
  - Feature code

All new feature classes are stored as ESRI 3D Shapefiles. The default feature class definitions are defined according to USGS topographic and planimetric mapping standards.

**GIS Data Attribution**

Qualitative spatial and non-spatial GIS data can be collected and updated during the feature collection process. Automated feature attribution techniques are used to populate and update feature attribute tables during feature collection and editing.

Automatically attributed information includes:

- Feature code
- Feature ID
- Area (polygon features)
- Perimeter (polygon features)
- Length (polyline features)

The CellArray™ capabilities within Stereo Analyst can be used to organize, export, format and manipulate feature attribute information.