

Fledermaus Software Suite Training

Standard Module II

Fledermaus Basics



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“3D VISUALIZATION – MORE THAN JUST A PRETTY PICTURE”

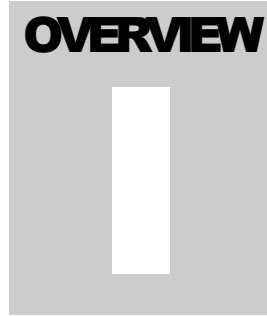
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TUTORIAL I – WORKING WITH FLEDERMAUS DATA OBJECTS

Working with Fledermaus Data Objects

Introduction

The visualization system is designed from the ground up to provide flexible object-oriented visualization. Each loaded data set in the system is considered an object. The system supports many different types of objects, which can be categorized into two types, either visual data objects or container objects, also called container nodes. Visual data objects are designed to display some type of data within the system.

For example, surfaces are often visualized using the **BasicDTM** or **SonarDTM** visual object types. This object type displays a shaded, uniformly gridded surface. It supports several different ways of representing the surface, such as a wire frame or a shaded surface. The BasicDTM object encapsulates all the necessary data to represent the surface along with the know-how to visualize that particular data.

When multiple objects are loaded the scene does not merely consist of a large collection of polygons but rather a collection of self-contained objects, which work together to represent a scene. This allows the easy implementation of features that work at the object level such as geo-referencing and object interaction. Visual objects can represent almost anything from a simple plane or grid, to complex objects linked to real-time data acquisition systems, or objects whose data evolves over time.

Container objects provide data management abilities and allow the system to display multiple objects simultaneously. The primary duty of a container node is to manage a list of children objects. Any child object can itself be another container object with the ability to manage a list of its children. The result is that the system is capable of maintaining a hierarchical tree of objects. This structure provides a convenient mechanism for grouping related data. Given that the primary duty of container objects is to manage children objects, they often do not themselves contain visual information; however, this is not always the case. For example, The CableParent container node is designed to manage a group of digital terrain objects. It also adds the ability to store and visualize the route of a cable or pipeline that is to be overlaid on the surface.

FLEDERMAUS TRAINING

PURPOSE

Throughout this tutorial you will:

1. Become familiar with the Fledermaus user interface
2. Load prepared SD files into Fledermaus
3. Use the widget based interface to navigate around the 3D scene Data
4. Understand the file selection dialog box

Data Input: MODULE2/tutorial1/portsmouth.sd Data Output: NA

1 The Fledermaus User Interface

The main Fledermaus application window consists of five important regions:

1. the *Main Visualization Window* in the center;
2. the *Main Menu Bar* that runs along the top of the application;
3. the *Geo-Referencing Info Bar* just below the menu bar;
4. the *Control Panel* with icons on the upper right hand side of the application; and
5. the *Data Object Control Region* along the bottom of the window.

The **Main Visualization Window** is the viewport into the virtual 3D world. It is primarily a display space but does contain a number of controls and interaction functions. The actions of the mouse in this space depend on the interaction method and icon mode. Normally the left mouse performs rotation or selection, the middle does center on pick, and the right mouse button is used for profiling.

The **Main Menu Bar** across the top contains seven menu options that provide file input and output functions, exploration and data set control dialogs, rendering options, options to manage data queries and help.

Located just below the main menu is the **Geo-Referencing Info Bar**, which contains two information fields. The left field displays information about the current rendering state (Normal, Exploring and Rendering Best). When the scene is fully rendered in the main window the state will be Normal. As soon as an exploration action occurs, such as manipulating with navigation widgets, the system will switch into Exploration mode. This mode renders the image in a somewhat degraded state to make the scene motion smooth. The moment the exploration stops, the system switches into Rendering Best mode while the application works to fully render the data in the highest possible resolution. When the rendering is complete the system returns to Normal mode. The second larger field displays the geographic position of the cursor when over the *Main Visualization Window*.


The **Icon Control Panel**, located to the right of the *Main Visualization Window*, provides dataset configuration and interaction controls. The *Control Panel* also contains a few of the more commonly used system functions.

The **Data Object Control Region** provides information and controls for the data objects actively loaded into Fledermaus. This section provides details that are common to all data object types. This resizable region is located along the bottom of the *Main Visualization Window*. The vertical size of this region can be changed by clicking and dragging on the horizontal bar that runs along the top of this region. When the cursor is over the resize bar it changes from the standard left pointing arrow to a light crosshair cursor. Reducing the size of this region makes the *Main Visualization Window* larger and vice-versa.

The Control Region has two different panels, the *Data Set Control* and the *Geo-Picking* panel that are activated by click on their respective tabs located on the bottom left edge. Clicking on the tab will bring that panel to the front. The relatively simple geo-picking panel and the more complex data set control panel are described in a following section.

Note: All user entry fields are displayed in white. All other fields provide display information about the current object's viewing state.


1.1 Exercise – Main Menu Bar: Loading a Data Object

1.  Click on File on the Main Menu Bar

2.  Click on Open Data Object

Prepared data is loaded into Fledermaus using the *Open Data Object* command. The dialog box for loading data allows the loading of one or more data objects.

By default, Fledermaus expects to load files that end with the extension “*sd*”, which stands for scientific data.

3.  **Navigate to `MODULE2/tutorial1/portsmouth.sd` to load the `Portsmouth.sd` (or any other `.sd`) file by simply double clicking it or select a file ending in “`.sd`” and click the Open button**

In windows, the *File name* entry field in the file selection dialog contains the name of the currently selected file. The *Cancel* button exits the *Open Data Object* dialog and does not load a file.

You will see `Portsmouth.sd` appear in the Lower left hand portion of the “Data Object Control Region”.

2 Main Visualization Window – Navigation

Fledermaus provides two powerful mechanisms for exploring data objects in the virtual 3D data space. These exploration modes enable you to navigate quickly and easily.

- a mouse-controlled widget navigation interface, based on a centered zoom and rotate data manipulation technique; and
- 3D flight using a six-degree of freedom input device (3D flight will be discussed at length in a following tutorial).


Both modes allow you to position a virtual camera in the scene. The resulting view presented to you is what the camera sees from its position and orientation within the virtual world. The exploration modes use different controls and user input to move this camera about the scene.

Both have their own strengths and weaknesses.

The flight mode provides for smooth navigation across both large and small datasets while the widgets provide a fast and effective center, zoom and spin interface, which quickly focuses attention on the area of interest.




THE WIDGET NAVIGATION INTERFACE


The mouse based widget navigation (pick and zoom) interface uses on screen widgets and direct interaction with the data space. The main point to remember with this interface is that all rotations and zoom occur about the **center of the screen**, and picking on a new location will move that point in the scene to the center of the display. The visibility of the widgets can be

toggled by clicking the widgets button .

USING THE MOUSE BUTTONS

The primary method of moving the data in the Fledermaus visualization window is via the three buttons on the mouse. Their use depends on the mode selected on the Control Panel. The

three modes are *Explore* , *Select*  and *Polygon Select* . *Explore* mode is set as the default.

 *single button mouse operation: left click = click, shift-click = and right click = control-click*

List of Shortcut Keys for Fledermaus

Space bar or G key = Enter Explore Mode.

S key = Enter Select Mode.

P key = Polygon Select Mode.


H key = Toggle Widget Visibility.



C key = Toggle Color Bar Visibility.

B key = Toggle Bounding Box Visibility.


2.1 Exercise – Explore Mode



Explore mode optimizes the mouse buttons functionality and aids in quickly and effectively navigating around the 3D world. It is unnecessary to pick the surface to see the geographic position as the position is continuously updated in the *Geo-Referencing Info Bar* as the cursor is moved over the surface.

Hint: Clicking on the *Reset Camera*  button on the Icon Control Panel returns the data object to the default camera position. If the data objects are lost from view in the 3D scene simply click this button to return to the default viewpoint.

1.  Click, hold and drag ( control click) the left mouse button anywhere on the Main Visualization Window to rotate the data about either axis – vertically or horizontally.


The object can also be rotated by clicking and dragging directly on the rotation widgets. When the surface is being rotated around either axis, the corresponding arrow bar will turn blue. Note that the “N” on the top rotation widget indicates which direction is north.

To set the object to rotate continuously, left click and drag the widget to start the object rotating and then click the middle mouse button to lock the rotation on. The arrow bar will turn red. To unlock the rotation left click on the widget again. ( not available)

2.  Click and drag on the cone shaped arrowhead at the top of the vertical axes to dynamically change the vertical exaggeration of the object. Note that the value of the vertical exaggeration will be shown in the Exag field at the bottom left corner of the screen in the Data Object Control Region.
3.  To zoom in and out on an object, click and hold the middle mouse button down on a picked position then move the mouse up or to the right to zoom in OR down or to the left to zoom out.

The widget on the left side of the Main Visualization Window may also be used to zoom in and out. The right hand side widget is used to pan along the Z-axis.

PROFILING

4.  Click and hold the right mouse button and drag the mouse to generate a profile. Profiles are displayed in the Profile Dialog. It opens automatically when the profile is drawn on the 3D surface.


The colors under the profile represent the color of the surface along the profile.

The axes are labeled with the height and the distance along the profile.


The vertical exaggeration, the profile's end points and the length of the profile are displayed in the *V-Scale*, *End Points* and *Distance* text fields respectively.





You may click and drag anywhere in the profile to get an exact distance and slope in degrees of your selected area.

Clicking on the Profile button will open a window where you may save, open, close or make a screen capture of your currently generated profile.



5.  Click on the Profile pull down and select Save Profile button to save the profile information to a text file. Each point in the profile will be written to the file as distance and height along the profile.

2.2 Exercise – Geo Picking

Select mode  is used for explicit geo-picking and is often used to support special actions for the various loaded data objects. The actual actions depend on the data type loaded and are described in detail in another exercise. When a surface is geo-picked, a cross appears at the pick point and the coordinates of the point will appear in the *Geo-Referencing Info Bar*.


1.  Show the Fledermaus geo-picking information. This can be done by selecting the geo-picking tab on the bottom of the Fledermaus window
2.  Click on Select Mode on the Control Panel
3.  Click on any surface on the Main Visualization Window with the left mouse button to display coordinates, which will appear in the “Current Point” fields.
4.  The middle and right buttons still perform zoom and profile operations respectively







Assuming you are still looking at the Portsmouth dataset, you might notice a number of linear patterns of small amplitude spikes. To get a better idea of the feature being discussed, we will use the locate point button.

5.  Enter: 361450 and 4769896 in the x and y fields respectively.
6.  Hit the locate point button. You should now see the point marker centered on a spike.

What do you think these spikes are? *

2.3 Exercise – Polygon Select Mode

The *Polygon Select*  mode is used to draw polygon structures by picking points on the visualized data. These polygons are used in conjunction with tools like the *Surface Query Tool*, (explained in a following exercise) and can also be saved into other data objects for representing things like track lines, polygonal areas of interest, etc. In this exercise we will delimit an area of bed forms centered on 361219E, 4769722N.

1.  Click on Polygon Select Mode on the Control Panel
2.  Click on the surface to define points that characterize the shape of the “rippled” area. These points will act as polyline or polygon vertices.
3.  Double click on as last point entered to close
4.  Select Data > Add 3D Line to add a 3D line object into the scene. (this would be to mark an area for a specific reason)
5.  On the Data Set Control tab window click on the new Internal 3D lines
6.  Press the Add Polygon Selection button in the 3D Line control panel. Pick new points and press the Add Polygon Selection button to add the next line. A 3D Line object can contain more than 1 polygon.

*These spikes are real data and are actually strings of lobster traps.

Once the required lines are loaded they can be saved using the **File > Save Object** menu.

The lines can also be exported as an ASCII XYZ file by pressing the **Export XYZ** button on the 3D Lines control panel and entering the desired file name. This operation is good if you want to create 3D polylines instead of polygons.






In Polygon Select mode, the middle and right buttons have the same function as in Explore mode – zoom and profile respectively.



2.4 Exercise – Icon Control Panel – Additional Buttons

The *Control Panel*, located to the right of the *Main Visualization Window*, contains a number of other commonly used controls. Reset Camera, Explore, Select and Polygon Select have already been discussed above.

USING OTHER CONTROL PANEL BUTTONS

2.4.1 Exercise – Show Cmap

1.  The Show Color Map button  is located below the mode select buttons. Click this button now.
2.  When the Color Map button is toggled on, the software will show or hide the currently loaded color map in the Main Visualization Window. Please note that the displayed color map is the system default (Step16) and may not necessarily match your currently loaded sd file.
3.  To display the color map associated with your loaded file click on Controls > Color Map Display to display the Color Map Control window.
4.  Click on Browse to go to the system’s Color Map Directory.



5.  Find the color map that matches your data set and load it. In this instance, click on `colorsinterp.cmap` to display the current `Portsmouth.sd` file's cmap.
6.  You may click anywhere in the Position window to customize placement of the color map on the Main Visualization Window.

2.4.2 Exercise – Bounding Coords

1.  Click on the Bounding Coords  button

The **Bounding Coords** button will show or hide the Root Node's bounding box and associated coordinate labels. Note that coordinate labels only appear after the object has been geo-referenced.

2.4.3 Exercise – Geo-Reference Units

1.  Click on the Geo-Reference Units Pull down menu  located beside the Geo-reference button.

The geo-referencing units to use in the 3D scene are selected from the *Geo-Reference Units* pop-up menu. The default option of *Any Units* asks the system to automatically figure out which units should be used. If the automatic detection fails for some reason, the units can be assigned by selecting one of the options including **Lat/Long/Height, Easting/Northing (UTM), or Meters.**

NOTE: After Geo-Referencing the button's label will change from 'no label' to a unit label associated with the loaded data file. Use the geo-reference button a lot. It's a good habit to automatically click it whenever a new dataset is loaded. Features like the profiling won't work properly unless the data is geo-referenced.



2.4.4 Exercise – View Manager

1.  Click on the Controls menu and select View Manager .

This action opens the View Manager Dialog.

This dialog allows the loading and/or saving of a particular camera position to a file. The camera position is not linked to any data objects; it is merely a position and orientation in the virtual 3D world.

Selecting a saved view will return the camera position relative to that data object. Saving interesting views of data sets allow you to return to these viewpoints quickly and easily at a later time.

2.  To save a viewpoint, specify a filename in the View Name text field in the Save Current View section of the pop-up window.
3.  Click on the Save button

View files will be specified in the **Available View** window list box. To return to a viewpoint that is stored simply click on the file name in the **Available Views** list box. It will display immediately.



TUTORIAL II – WORKING WITH SCENES & SCIENTIFIC DATA TYPES

Scenes & Scientific Data Types

Introduction

One of the primary uses of Fledermaus is its ability to load a variety of data types at different resolutions and explore them in a 3D scene. This allows the software to be used for a wide range of applications and even multiple times during the same project. Some typical uses of the Fledermaus software include:

- Geological applications - interactive exploration of seafloor morphology, backscatter, and sub-surface data to better understand geologic processes.
- Hydrographic surveys – data ranging from raster chart, historical seabed and ongoing survey data, and processing and quality control of large volume high-density multibeam survey data.
- Geohazard analysis – combination of data from all sources aid in the analysis of hazards and planning for offshore engineering development. This includes data from existing maps and seabed models combined with sonar Bathymetry and imagery, subsurface profiles, seabed characterization, pipeline or cable routes, seabed samples, or proposed structures.

The software has been designed to be object oriented allowing for the addition of many data types. The complexity of these objects can vary from simple, such as a label or grid, to highly complex types such as the PFM class, which is a full multibeam (XYZ-attribute data) editor/quality control object.

Each object type supported by Fledermaus is called a scientific data class or SD class for short. Any file that is prepared for loading into Fledermaus is given the filename extension .sd.

Each SD class contains a user interface component, which is displayed in the Data Object Control Region of Fledermaus. Interaction with the objects is normally performed through this graphical interface; however, controls for general exploration in the Main Visualization Window remain basically the same as for any object.

PURPOSE

Throughout this tutorial you will:

1. Load a variety of data types (.sd objects) at different resolutions and explore/interact with them in a 3D scene
 - Geo-reference and profile multiple data objects to see how things fit together
 - Work with attribute controls for the surface object
2. Understand what data the SD class represents and understand how data is prepared for the visualization process
3. Create and save scenes
4. Explore a pre-created scene that contains a variety of different data types.

1 Loading and Geo-Referencing Multiple Objects

1.1 Exercise – Loading Multiple SD Files

Fledermaus allows you to load and work with multiple data objects together in a scene.

Data Input: MODULE2/tutorial2_1/*.sd **Data Output:** Saved Scene

1. Click on File > Open Data Object

Selecting this option displays the standard file selection window.

Navigate to the module2/tutorial2_1 directory. In this directory you will see five SD files labeled can3d30sub, Etopo2, Etopo5, Globe and SRTM30.

2. To add each of these files to the Fledermaus Main Visualization Window, hold down the CTRL button and select all the SD files or use SHIFT to select the first and last files (and the files in between). Click the Open button.

The Open Dialogue window operates/supports the same features as any windows dialogue box with regards to file selection (i.e. shift and control keys). While you could load each file individually, it is much faster to do a multi-file load.

4. In the Data Set Control window check or uncheck the checkboxes to turn objects on and off. To delete an object from the view, press the Delete key.

5. Click on Controls > Geo-Referencing. Select each object in turn by checking the object's check box to show the object's coordinates. A bounding box will show around each of the individual datasets. Click Close to close dialog.

6. Fledermaus will allow Profiling across multiple objects as if they were a single object. Try making profiles that span across the different data sets.

7. Select an object and change its attributes to wireframe.


Select the data object you wish to modify from the dataset control window. The wire frame surface button can be found to the right of the dataset control window. To see the effects of the wireframe surface you may have to zoom into your data object. *Wireframe mode is not frequently used, but can be useful to visualize how big the surface cell size is.*

8. Use File > Save Scene to save the current scene as multiData.scene.

A scene consists of one or more objects to be loaded along with any transformations and visualization parameters that were set when the scene was saved. When you reload the scene file you should see it as it was saved. Normally scene file names have the filename extension **.scene**. If you do not specify it then Fledermaus will add it automatically.

1.2 Exercise – Working With Scenes

Scenes are used to save and reload complex visualizations constructed over one or more sessions.

When opening a scene file the dialog will default to displaying only those files that have the .scene extension.  On Macs other file types are grayed out.


Data Input MODULE2/tutorial2_1/multiData.scene **Data Output:** NA

LOAD A SCENE

1.  Click on File > Open Scene

Selecting this option displays the standard file selection dialog.


Selecting Open Scene will automatically place *.scene in the Type of File field.

2.  Open the scene (multiData.scene) you saved in the previous exercise

When a scene is loaded the current data object hierarchy will be replaced with the one contained in the loaded scene file.

EXTRA CREDIT:

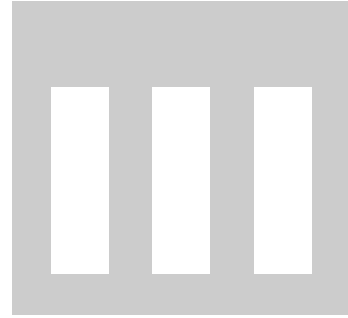
1.  Click on Open Data Object and load Area*.sd.

2.  Click on file > Save Scene and save the data as Areas.scene.

3.  Click on File > Open Scene.

4.  Load the file “Areas.scene” from the module2/tutorial2_2 directory

This scene contains several overlapping sections of Portsmouth harbor in New Hampshire.



TUTORIAL III – INTERNAL OBJECTS & MISCELLANEOUS DATA TYPES

Internal and Misc. Data Types

Introduction

The previous tutorials have given you a fairly good introduction to much of the functionality of Fledermaus, and how Fledermaus handles data. Life would be simple if the job ended when the survey was completed, or a better pipe route was engineered. But we often need to communicate this information to others. On today's multi-disciplinary projects, fellow team members and or management may not have any understanding of the scientific or engineering concepts or be fluent in the jargon that pervades most scientific and engineering fields. Sooner or later you will have to communicate what you have been doing and where the money was spent. Fledermaus can aid in trying to get the point across and in the process make you look good by adding polish to your presentation (see also the following tutorial on movie making). In the case of Fledermaus a picture may very well be worth a thousand words.

In this tutorial we will integrate several datasets and use some of the Fledermaus internal objects to finish the visualization of an area in San Francisco Bay (data provided by U.S.G.S).

PURPOSE







Throughout this tutorial you will:

1. Add contours and save them as 3D line objects.
2. Add planer and point internal objects.
3. Add 3D solid model.
4. Save a scene.

1 Importing & Using Internal Objects & Misc. Data Types

1.1 Exercise – Contouring a Surface




Data Input MODULE2/Tutorial3_1/goldenGateBase.scene Data Output Contours.sd




1.  Click on **File > Open Scene** and navigate to and load the **Golden Gate scene file**. You should see part of the floor of the San Francisco Bay colored by depth with the headlands and several islands colored in grey.
2.  Select the **Tools menu > Contouring**. Select the **GoldenGate.dtm.sd**. The elevation Range should be approximately -115.4 to -1.7.
3.  Select the **Add Common Charting Intervals button**. This creates a contour interval that varies based on the water depth. You can also base your intervals by manually entering a Starting Elevation and/or the Elevation Step between contour intervals.
4.  Click the **Apply button**. This may take a while depending on the speed of your computer.
5.  Click the **Close button** when the contour lines appear on the seabed.
6.  Highlight the **Contour_GoldenGate.dtm.sd**. then Click on **File > Save Object**. Navigate to this tutorial directory, MODULE2/Tutorial3, and save the file as contours.sd.

1.2 Exercise – Adding and Importing Data

Data Input MODULE2/Tutorial3_1/goldenGateBase.scene Data Output: N/A

This exercise will just add the final polish and give this presentation a sense of virtual reality.

1.  Add the water's surface by clicking **Data > Add Plane**. A white plane should appear.
2.  Put the plane in the correct position by selecting the “internal plane” in the dataset control area. You will see a transparency slider, a Height entry field and a Set Color button. Next click the **Set Color button** and choose an appropriate color – i.e. blue/green that is similar to the color of sea. Finally, set the transparency to a value where the seabed can clearly be seen through the sea surface.
3.  Now for the final touch, we will load the Golden Gate Bridge. This object is a 3DS file that can be directly imported. To do this, select **File > Import > Import Model tab** and navigate to this tutorial folder and select **Goldgate.3DS**, and then select **Open**.



4.  You will see that this object has no real world coordinates associated with it. (Controls > GeoReference). We will have to manually move it to where we want it. **Select the GoldenGate.3DS file. Click the Transform button. A transformation window should appear.**
5.  **Play with the various buttons.** The 3 sets of operations, Scale, Translate & Rotate should be self-explanatory, though in 3D space, the results of pressing buttons may result in the unexpected. The arrow buttons make small increments in the relevant operation. By selectively clicking these buttons or manually inputting data you can move, rotate or scale an object to pretty much any position.
6.  Once you have used the buttons a bit, you may choose to try to manually move the bridge to fit it across San Francisco Bay, or you can **type the following numbers:**

Remember to hit enter after each text entry!

Scale	Translate	Rotate
0.2	-0.355	0
0.05	-0.290	0
2.1	0.4	-90

Remember to hit enter after each text entry!

Note: For those users that have the facilities to generate 3d models, it is advised that you do your georeferencing in your generation software, as Fledermaus currently limits the bounds of the object within the original bounding coordinates so that rotation of objects can often distort the objects.

7.  Let's make the bridge colored similar to real life by changing the color. **Select GoldenGate.3DS and then click the Set Color button. Choose a satisfactory shade of orange that is similar to the color of the real golden gate bridge.**
8.  **Save the scene in this tutorial directory as GoldenGate.scene.** If you do not save the scene, you will have to line up the bridge every time you load it.

2 Exercise – Importing Vertical Imagery

Data Input: MODULE2/Tutorial3_2/site2.scene 220Trans.tif **Data Output:** N/A

This exercise demonstrates the use of vertical images and gives supplemental directions on how to create masks, which in this case is used to mask out the water column in a sub-bottom profile.

Background information

Before we can bring in a transparent image (either vertical or horizontal), we will have to use an image-editing package to insert an alpha channel to be used as the transparency layer. For reference, the following is a brief description as to how you would do that. For the sake of expediency, we have provided you with a sub-bottom image (courtesy of C&C technologies).









Creating a transparency:

This procedure will be described using Adobe Photoshop 6.0, but any graphics package that supports transparency layers should be adequate. IVS also provides the ability to create masked images by using Image Viewer. If you are curious about seeing this, let your instructor know.

- 1) Load the image file into Photoshop.
- 2) Make sure advanced tiff saving options are enabled.
- 3) Use the rectangular marquee tool to select the entire image.
- 4) Create a new image and when the new image dialogue comes up, make sure that you select transparency under the contents area at the bottom of the window.
- 5) Past copy of the old image into the new image.
- 6) Use one of the selection tools to select then delete all non-data areas of the image.
- 7) Save the image. Select save transparency button at bottom of save dialogue box.

2.1 Importing vertical image into Fledermaus.

We will start with a processed sub-bottom image. To have this image appear correctly in the Fledermaus 3D environment, you will need to establish the x and y coordinates of the side edges of the image. You will also need to know the z coordinates for the top and bottom of the image. With this information, you will be able to load the image into Fledermaus.

1.  **Start Fledermaus.**
2.  **Load site2.scene into Fledermaus.**
3.  **Under the File > Import menu select Import Vertical Image.** This will open a file selection dialogue.
4.  **Load 220Trans.tif.**
5.  **Select the vertical image object in the dataset control window.**
6.  **Enter the min and max x y and z bounds of the image into the end points fields to the lower right side of the Fledermaus window (xyz ranges are: 1841829.5, 1841830.5; 9986072.0, 9966382.0; -3674.5, -2723.0 respectively).**
7.  **Georeference the data if necessary.**
8.  **Activate the Mask Out Areas button at the bottom of the Fledermaus window (if not selected already).**



TUTORIAL IV – USING THE IVS BAT

Using the IVS Bat

Introduction

The IVS Bat mode of exploration provides a powerful means to navigate around the 3D data space with the use of a 3D (six degree of freedom) input device. A supported 3D input device must be connected and turned on before starting this mode.

PURPOSE

Throughout this tutorial you will:

1. Connect a BAT to a computer
2. Become familiar with the IVS Bat and fly around data
3. Become familiar with movie making by recording a flight path

1 Bat/Computer Setup

The 3D input device, or Bat, is shipped from IVS extensively tested and in a state that, other than a few connections, the device should operate “right out of the box”. The configuration of the Bat parts and connections can be seen below.

Once the Bat is connected to the computer, plugged in and turned on, you will need to set up the Fledermaus preferences.



Front view of Bat:

1. base unit
2. bat receiver handle
3. receiver connection ports
4. transmitter
5. transmitter connection port
6. power indicator LED







Rear view of Bat:

1. base unit
2. power port
3. on/off switch
4. RS232 connector
5. dip switches
6. power transformer

1.1 Exercise – Setting Fledermaus Preferences

1. Start Fledermaus
2. Select File > Preferences. This should bring up the Fledermaus preference window.
3. In the Preference Group window, select 3D Flying. This will bring up a list of 3D devices and ports.
4. Assuming you have purchased, and are using an IVS Bat, you should select Polhemus Isotrack II.
5. Set the port to the device port you are using or in other words the port your serial cable is plugged into – usually port 1.
6. Click the “Apply Changes” button at the bottom of the window, followed by the “Make Default” button.

7.  You are finished here in regards to the Bat, so you can exit out by pressing the OK button.
8.  To test if your Bat is working properly, select Exploration > 3D Flight.
9.  When you hold down either of the Bat buttons (see below), the predictor should appear on the screen and react to your hand movements.
10.  If you are still not sure, import a simple data object, this can be done by selecting Data > Add Grid. If all is working correctly, you should be able to fly around this object.



Recommended bat grips. (Note that either the trigger or top buttons can be used to activate bat movement.)

1.2 Exercise – Trouble Shooting Bat

If you have problems starting the Bat, you should first check the hardware and software configurations:

- Is the Bat connected to the serial port you are trying to use?
- Is the Bat turned on?
- Are the preferences in Fledermaus set to the correct port and type of device?

If all of the above seem to be in order, then you will have to use the Device3DServer applet (which Fledermaus and the Bat use to communicate), which can also be run independently to find the fault.


When trouble shooting it is best to directly run the Device3DServer applet from the command line so that you see a scrolling list of numbers when the Bat is correctly operating. Once the Bat is running you can also then run Fledermaus separately and change to the 3D flight mode.

OTHER THINGS TO CHECK:

1.3 PC Windows Platform


If the Bat is turned on and the serial cable is plugged in when Windows is booted, Windows will try and configure a serial mouse for the Bat. This will cause problems. **The simple solution is don't turn the Bat on until Windows is booted.**

1.4 Exercise – Any Unix platform


1.  **Double-check the serial port permissions.** Often they are configured by default to only allow reading from the serial port. The Bat requires both read and write permissions. To check port permissions change directory (cd) into /dev and type “ls -l”.

Depending on platform the serial port device name is:

	SGI	Sun	Linux
Port #1:	/dev/ttyd1	/dev/term/a	/dev/ttyS0
Port #2:	/dev/ttyd2	/dev/term/b	/dev/ttyS1

2.  **If your settings are not correct, you will need to become root or contact someone with root permissions:**

Change mode by typing: “chmod 777 *port*”. This gives full permissions to the port. The execute permission (7) is not strictly necessary but is probably a good idea.

3.  **Test the Device by running the program: Device3DServer -h for help**

Example: Device3DServer -device Isotrak2 -port /dev/ttyS0 -v





Don't forget the -v command for verbose output. You will see a few messages and if all is well after 4-8 seconds you should see a continuous stream of numbers. If you do and they're not all zeros then the Bat is working and all should be well.

On the Unix platforms if you get the message unable to open port, and you have previously checked the permissions, then this often means that the cable connecting the computer to the Bat is missing a NULL modem adapter (or has one too many), or rarely, the cable may be failing.





2 Becoming familiar with the IVS Bat

2.1 Exercise – Using the BAT

Data Input: MODULE2/Tutorial3/Canyon.sd Data Output: N/A

1.  Start Fledermaus and load the canyon.sd object from the Tutorial3 directory
2.  To emphasize the topography somewhat enter 6 into the Exag (exaggeration) box. Press Enter
3.  Change the exploration mode to 3D Flight mode by clicking Exploration menu > 3D Flight
4.  Try flying inside the canyon from one end to the other. To begin flying, press and hold down the trigger button on the 3D input device.

While the button is held down, hand movements of the device are mapped in a natural fashion to movements within the 3D scene.

5.  Move forward in the scene by simply pushing your hand forward while holding down the trigger
6.  Move to the right by moving your hand to the right. Rotations are accomplished in a similar manner
7.  Twist your hand to the left to turn left
8.  Twist your hand upwards to turn up, and so on

The speed of movement in the 3D scene is mapped non-linearly from the hand movements of the input device. Slow hand motions provide detailed and fine adjustments while fast movements accelerate the exploration speed allowing you to quickly move around the entire scene.

To support large data sets, the image of the data is normally degraded when flying. This increases the rendering speed of the scene while still supporting large data sets. As soon as you let go of the trigger, the flight stops and the scene begins to draw at its best possible resolution. At any time you may continue the exploration by pressing the flight trigger button and resuming your flight.

9.  Select Controls > Projection

The projection parameters affect the presentation of the virtual 3D world.


In the dialog there are three entry fields that may be used to configure the *Near Clipping Planes*, the *Far Clipping Planes* and the *Global Scene Scale* factor. To change any of these settings you would type a new value in the appropriate text box and click the *Apply* or *OK* button. Note that the

configured default values for the Near and Far Clipping Planes set by the system are not usually changed nor do they need to be.

10.  Change the Global Scene Scale value to 20.05.

Changing the global scene scale will change the speed with which you travel through the 3D data space. For example, making *Global Scene Scale* a larger number makes the scene bigger thus it will take longer the move across it.

11.  Click the reset camera button

12.  Repeat steps 3 to 5


2.2 Exercise – Recording A Flight Path

Fledermaus provides the ability to record a flight path used to explore a particular scene. The recorded path can then be replayed. Although the flight path can be recorded and played back, to create a true high-resolution fly through the movie must be rendered via the separate *movieclient* application provided with the system.

There are four steps to creating a movie in Fledermaus:

1. Generate a flight path in Fledermaus;
2. Smooth the flight path you have recorded using a smoother;
3. Use *movieclient* to generate the your movie.

Step 3 will be covered in another tutorial.

1.  When you are comfortable with your navigation skills, reset the camera and click on the Controls Menu > Movie Controls to create a movie

In general the menu buttons and fields are:

Record - recording mode can be toggled off or on. Flight paths are recorded at standard NTSC rates have a frame rate of thirty frames per second.

Play - used to preview a movie. It will play back the recorded movie frame by frame. The movie length is displayed with the format 'h:mm:ss.ff' where 'h' is the length in hours, 'mm' the length in minutes, 'ss' the number of seconds, and 'ff' is the number of frames. Clicking the mouse button in the main display window interrupts the playback.

Pause - Pause will halt the recorded flight path and display the current camera position.



Rewind - repositions camera to start of flight path.

Clear - used to erase the currently active movie. When cleared the length field will be reset to '0:0.0' to reflect the fact that the camera positions have been erased from memory.

2.  Click on the Record toggle button to turn recording on

When the *Record* Button is turned on the camera positions will be saved. As you fly around the data, new saved camera positions are always appended to the end of the current movie. Note that movies can be recorded using either the 3D flight mode or the widget based interaction mode.

Also note you can record some frames, turn off recording then move to another location, turn recording back on, and continue adding frames to the movie from this new position.

3.  Click on the Controls Menu > Movie Controls and select Play Current Movie
4.  Click on the File > Save Movie menu option and save the movie as marsflight.fph.

Previously saved movies can be loaded via the File > Load Movie menu option

Note: if you don't have the bat, you can use the widgets to record your flight or you can load Canyonflight.fph and play with it to see how each of the control buttons work.

2.3 Exercise – Making Movies

Movie making is the climax of working up your data. By producing a movie, you can distribute highlights of your dataset in a versatile mpeg format. Mpegs are playable on practically every computer, and are highly compressed so that they can easily be distributed via the Internet. With Version 6.0 and later, movie making is a far simpler process, with many of the complex technical aspects now made simple through use of the movie client wizard.




PURPOSE






Throughout this exercise you will:



1. Prepare data for movie making
2. Use Movie Client to render a movie

Data Input: canyon.sd **Data Output:** canyon s.fph, canyon.scene, canyon.mpg

We will use the flight path and dataset you used in the Fledermaus exercise 2.2.1. with one change. That is, to save the sd file into a scene, which is what movieclient expects. Use of the scene file is the best way for us to include multiple objects in the animation.

1.  Before we start, make sure your screen saver is off, otherwise you run the risk of making a very attractive animation of it.
2.  In Fledermaus open canyon.sd and save it as a .scene file.
3.  Start movieclient. This will open the movieclient wizard, which consists of a flight path preview window and an input dialogue.

4.  Use the **Browse** button to select and load both the scene file and the flight path.
5.  Press **OK**.
6.  You should now see step 2 of the wizard with several fields describing how long you want the movie and if you want to smooth the flightpath. **Set the length of the movie to 20 seconds. Save the new smoothed flight path as canyon_s.fph. Press the Smooth button.** This will smooth the flight you made in Module 1, Tutorial 4. The output file will be smoothed by sampling it at an interval specified by the fskip (frame skip) value. The simplified path is then sampled by the number of frames you specify by the length of the animation.
7.  Then press the **OK** button.
8.  You should now be on the Render Movie step. This is the area where you enter the type of output files you wish to create. We are going to create an MPEG here so leave that pull down as is. **In the Movie Filename enter canyon.mpeg for the output mpeg. We will create a standard MPEG-1 for this exercise.** We do encourage you to play with the different flavors of MPEG though so that you can judge for yourself which format works for you. The IVS MPEG-1 is a good start. It is a balance of image quality vs. files size and speed. You can also create your own custom animation output format by pressing the Customize button.
9. The Anti-aliasing and Render Magnification fields can be used to improve the quality of the output animation at a cost of rendering speed. If you increase the Anti-aliasing you will note the value increases to 2 and the preview window doubles in size. The more you increase anti-aliasing, the higher number of pixels you will have available to sample into the final MPEG resolution. **Make sure to set this back to none when you are finished.**

The render magnification operation dissects the rendering frame into sections that are rendered in sequence and then stitched together. This allow for small screens to render large frames (and higher resolution movies). **Again this comes at the cost of speed, so we will also set this back to none before we proceed.**
10.  Click **OK**.
11.  You will now see a series of frames start to render on your screen. **You can't really do anything until the rendering is finished.**