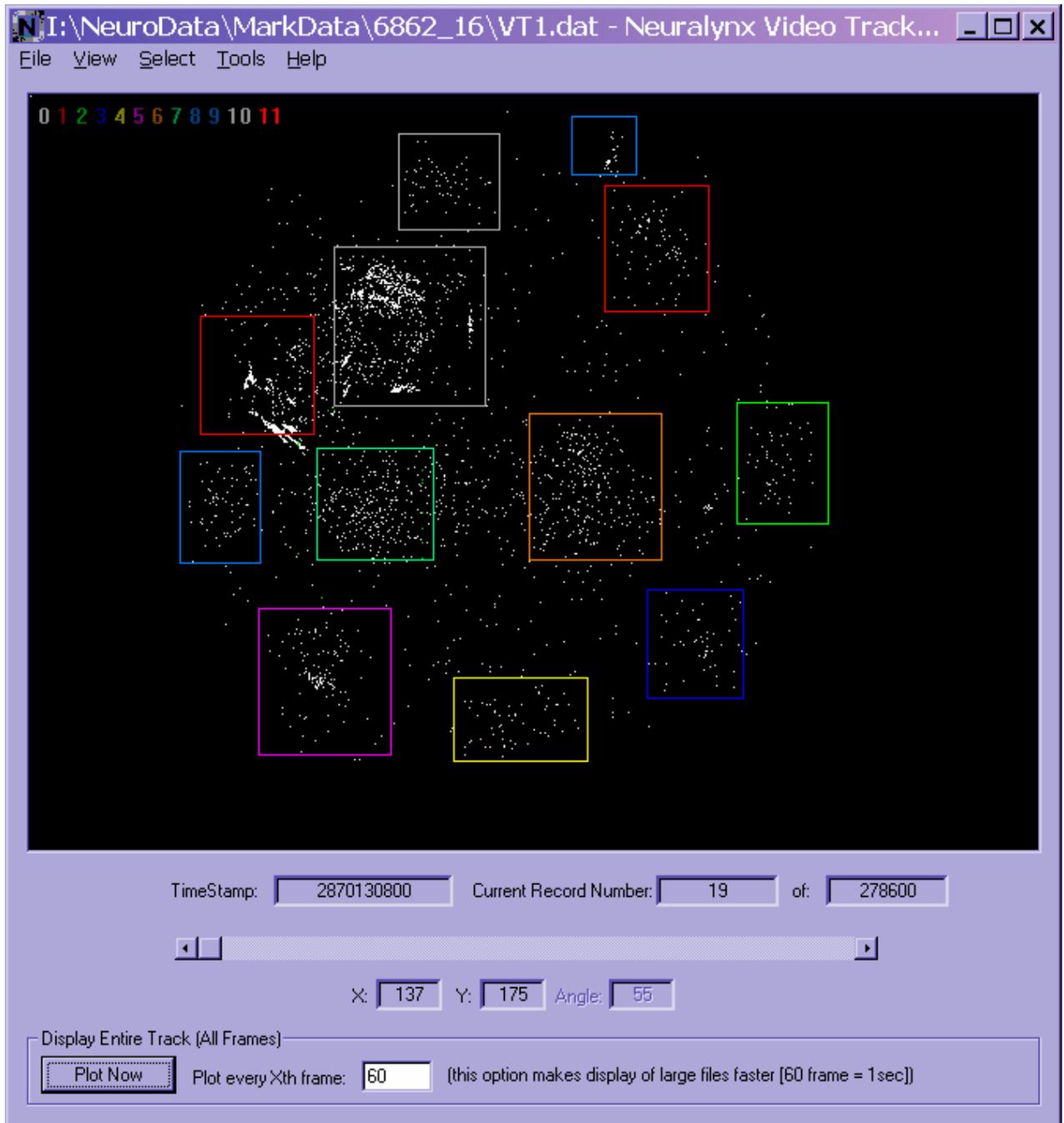


Neuralynx Video Tracker File Playback Utility User Documentation



This utility is designed to view & manipulate video tracker files.

You can do all of the following with this program:

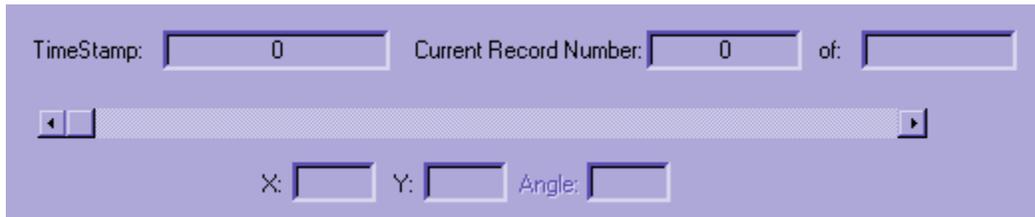
1. View the video frames in a file.
2. Plot a track of all positions in a file.
3. Extract timestamps for entering & leaving a given location.

Getting Started:

You can open an event file in any one of four ways (all are equivalent):

1. Start the program, then choose the 'Open' command on the file menu, and specify the location of your Videofile in the file box that appears.
2. Start the program, press the 'O' key on your keyboard while holding the 'Ctrl' key, and then specify the location of your Videofile in the file box that appears (you will notice that most menu commands have the 'Ctrl' abbreviation and a letter after them on their menu; all these commands can be accessed by using their special key combinations).
3. Start the program, and open a Videofile by locating a Videofile icon (using the 'Explorer' or 'My Computer' window), and dragging it onto the program window.
4. Automatically start the program and open a Videofile by locating a Videofile icon (using the 'Explorer' or 'My Computer' window), and dragging it onto the 'VideoUtility' icon (either the actual program or a shortcut to it, also located in the 'Explorer' or 'My Computer' window).

Viewing Separate Video Frames:

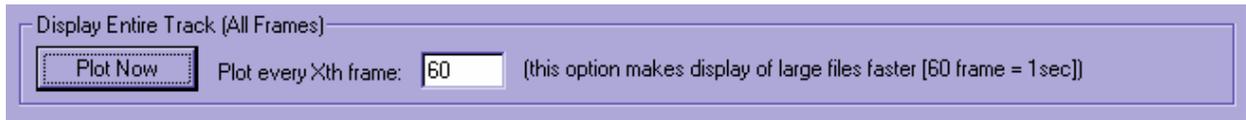


Once you have opened a Videofile using the program, you will be able to move through the file using the controls above. (If you have selected a file that does not actually contain video data, you may see unintelligible information in the 'TimeStamp' box; if this occurs, simply locate a file that contains event data and open it instead).

Controls:

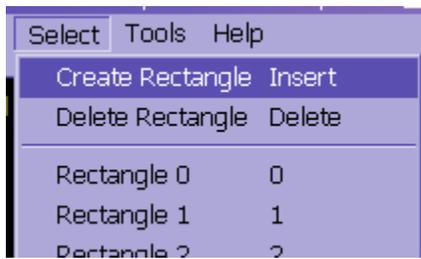
1. The 'TimeStamp' box will contain the timestamp for the current frame.
2. The 'Current Record Number' box will have the index number (from zero to the number of frames listed in the 'of:' box) of the frame which is currently displayed.
3. The 'of:' box contains the number of frames in the file.
4. The 'X:' box contains the X-axis location for the center of the headstage in the current frame.
5. The 'Y:' box contains the Y-axis location for the center of the headstage in the current frame.
6. The 'Angle:' box contains the angle for the headstage in the current frame. (This box is grayed to indicate that the current (08/2001) video tracker hardware does not provide valid angle information. The 'angle' is simply the number of lights visible, multiplied by five).
7. Pressing the arrows at the end of the scroll bar will move the display ahead or back by one frame.
8. Clicking within the scroll bar will move the current frame ahead or back by one second (60 frames for NTSC video).
9. Dragging (click-and-holding) the square slider in the middle of the scroll bar will move the current frame to the relative position of the slider within the bar. This is an excellent way to get an overview of the file, however, note that many frames are skipped over in the mode in the interest of speed.

Viewing a track (all X&Y positions) of the entire file:



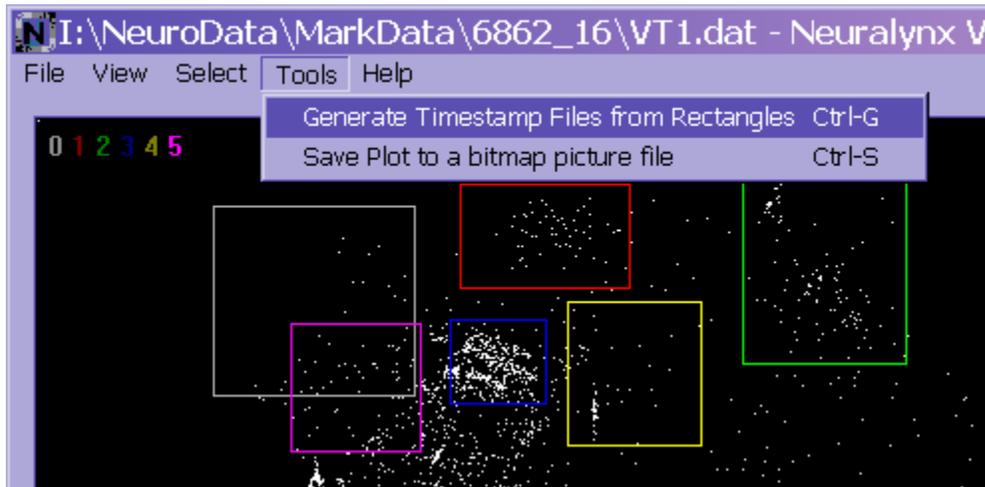
To view the track, simply enter a positive number (at least one) and click the 'Plot Now' button. As video tracker files are extremely large, this process generally takes a long time. Once this has been completed a single time, however, your computer's disk cache will contain the proper parts of the file in memory, and subsequent plots will complete much faster. The computer takes approximately 10 milliseconds to plot each record (the first time [and approximately 200 microseconds subsequent times]) on a 600Mhz computer. To find the length of time to complete your plot, simply take the number of records in the 'of:' box, divide by the number in the 'Plot every Xth frame' box, then multiply by 10ms.

Extracting timestamps for specific locations:



You may wish to extract all the timestamps for which the headstage was in a certain position for place-field or other studies. To do this, you simply choose 'Create Rectangle' from the 'Select' menu (or simply press the 'Insert' key on your keyboard). This will create a new rectangle in the window. You can change the position of the rectangle by clicking at one corner of the new location and dragging (moving the mouse without releasing the button) to the opposite corner. You can repeat this process to generate multiple boxes for different locations. Once you have multiple rectangles, you can select a given rectangle by choosing it from the 'Select' menu, or by pressing the appropriate number on your keyboard. Choosing the 'Delete Rectangle' command from the 'Select' menu, or pressing the 'Delete' key on your keyboard, will erase the currently selected rectangle (the currently selected

rectangle is indicated by the numbers at the top of the plot. The number which is brightest is the rectangle that is selected).



Once you have generated all the rectangles you require, you may wish to keep a visual reminder of their locations for future use. You can do this by choosing 'Save Plot to a bitmap picture file' from the 'Tools' menu. Once that is complete, you generate timestamp files from your data by choosing 'Generate Timestamp Files from Rectangles' from the 'Tools' menu. This will create two files for each rectangle. One file will contain the timestamps for which the headstage entered the rectangle, and the other when the rectangle was exited.

Converting Video Record Centers and Direction Angle:

Neuralynx Video Tracker Records that are created when using the Video Tracker option on the Cheetah Data Acquisition System calculate the center of the Head Stage being tracked as well as a directional angle. The center of the Head Stage is calculated by taking the mean of all targets acquired by the video tracker. This is not very accurate for two reasons, one being that if all the LED's are not being detected by the video tracker, the center is invalid. The center is also invalid if the video tracker detects other possible targets that are not LED's. The Direction Angle calculation is also incomplete. The angle calculation is designed to provide the current direction of the Head Stage, i.e. the direction should describe the front of the Head Stage. By using the "Calculate New Center/Direction" option within the "Tools" menu, a file may be updated with a new center and direction value using a new and more reliable algorithm.

When calculating a new center of the Head Stage, a perpendicular bisector algorithm is used for essentially finding out the center of a circle. If 3 or less targets have been identified, then the center is unreliable. This algorithm is based on the distance between targets. A maximum and minimum distance is used in the algorithms calculations and must be adjusted according to the data within the file. The minimum distance is the minimum distance that there should be between valid targets. Because of hardware caused jitter, a single LED may produce two targets very close to each other, therefore the minimum distance should never be set to zero. The maximum distance is largest distance allowed between valid targets. This is to prevent invalid targets from being included in the center calculations. The distance value is measured in pixels.

When calculating the new angle or direction of the Head Stage, the algorithm is based on the Head Stage 54 model. The algorithm is based on the position of the two blue LED's located on the Head Stage. If the blue targets identified by the video Tracker are invalid, it will cause the algorithm to be inaccurate. Also, if the Video Tracker does not identify any blue targets for a given record, then the default value for the direction is set to zero.

After selecting the "Calculate New Center/Direction" from the "Tools" menu, a dialog box will appear asking you for the filename to convert. This is a standard open dialog box and a file may be selected by double clicking a file or single clicking a file and then clicking the open button. A file may not be opened if it is already opened in the main display window. After selecting a file to convert, another dialog box will appear which is a standard save dialog box. Select a file to save to that does not contain the same filename as the file selected to convert or the file opened in the main display window. Once this is complete, if all parameters are valid, conversion will begin. An hourglass will appear as the cursor denoting that the conversion is taking place. When the conversion is complete an hourglass will appear and a small dialog box will appear that says "Conversion Successful", click "Ok" on the dialog box and everything will be complete. The converted file will automatically be opened into the main display window.

Viewing "Points" vs. "Targets":

In a Video Tracker Record there are two ways data can be represented. One way consists of plotting "Points". Points are each individual pixel that was identified by the Video Tracker. During

acquisition, an algorithm is run on the point values which creates "Target" values consisting of a group of similar contiguous points. It is possible to toggle between these two data modes when displaying an individual Video Tracker Record. This option can be found under the "View" menu, titled "Toggle View Targets/Points." The conversion algorithms used for calculating a new center and direction value are based on "Target" values only, not "Point" values.