# vpView for Annotations

Annotators at Kitware use vpView for most of their annotations.

vpView is a tool designed for making detection (single frame) or track (multi-frame) level annotations, with options for both boxes and polygons.

The following slides layout
1) the general procedure for annotations in vpView,
2) the relevant file formats and modifications that may be necessary during annotations.
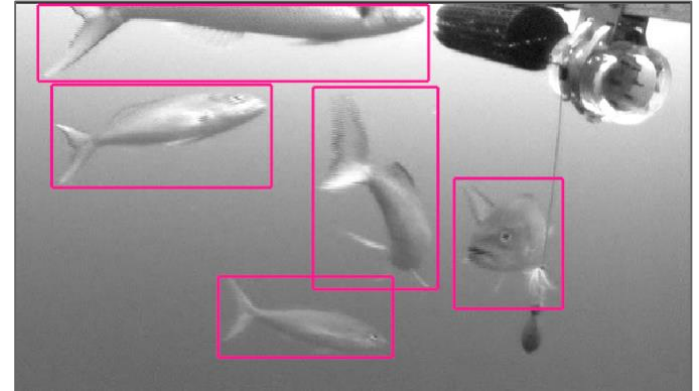
Loading imagery

vpView can either be pointed directly to imagery, an image list, or a compressed video file. It can also be given an input prj file that points to the location of input imagery and any optional settings (e.g. groundtruth, computed detections, and/or homographies for the input data).

To view imagery from a directory, compressed video file, or list:

1. Go to File ->New Project
2. Go to Imagery and select either 'Pick Image List or .Index File' or 'Pick Directory'
3. Navigate to desired imagery and select 'Open"
4. Select 'OK' in the dialog box and the imagery will load.

If choosing to view images using an input prj file, instructions for prj file creation are found on the next slide.
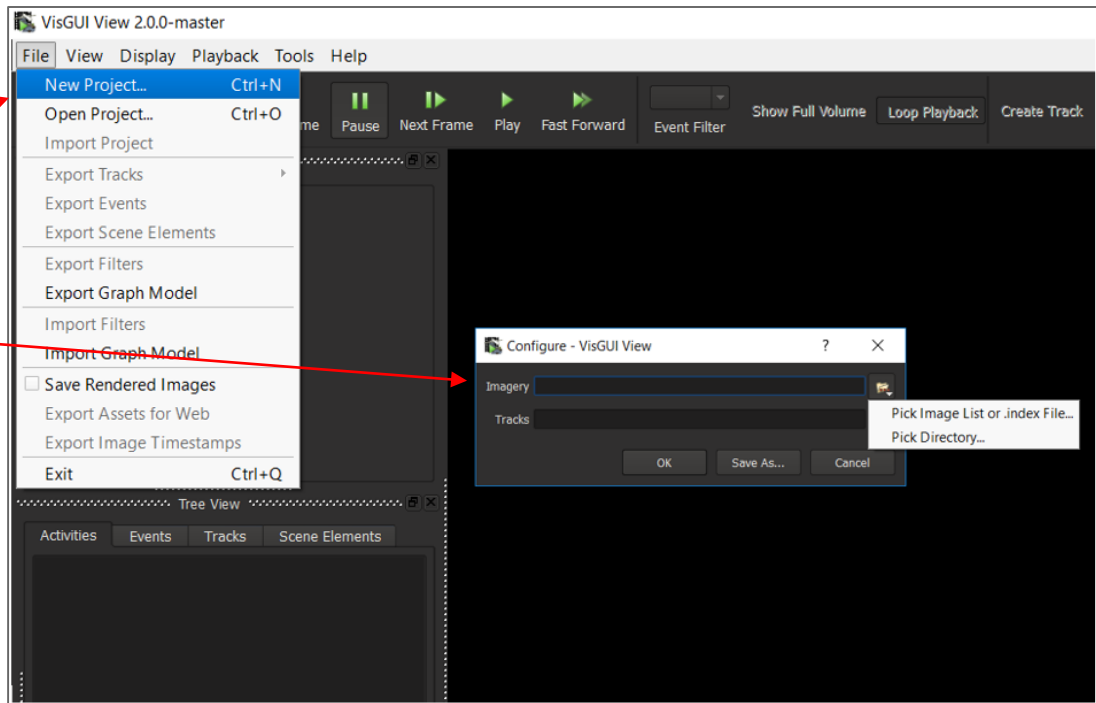
vpView Project File

The project file contains pointers to the imagery, track file, events, and complex activities if they exist. The template below describes the format of the prj file.

How to create a prj file?

We recommend using Notepad++ for making edits.

Copy and paste the prj contents from templates as seen on the right

Save as filename.prj

What is in a prj file?

DataSetSpecifier= .../image-location/0000_image.png
TracksFile= filename.kw18

ReadAndWriteAnnotatedEvents=1
EventsFile=
ActivitiesFile=
SceneElementsFile=
HomographyIndexFile=

OverviewOrigin= 0 0
Analysis Dimensions = 2028 1080

*Rename location of image files & track save file (kw18)*

*These files are not always necessary and these lines should be **omitted** from the prj when they are not used.*

These lines are used to define an Area Of Interest.
Omit if not using.

Preparing the prj file for annotation

1. Create (or modify an existing) prj file for the relevant imagery to annotate.
2. Open vpView.
3. Load prj file. (File -> Open Project)
4. Create Track. One box in one frame is sufficient.
5. Save kw18 file. (File -> Save) Use the same name as the TracksFile specified in prj file.
6. Close vpView.
7. Create an attributes file, if one does not already exist, if one is required for your task. A list of attributes will be task dependent and templates can be found online here. Save with same name as kw18 file.
8. Open vpView, re-load project and begin annotation. **Remember to save often!**

Creating a track
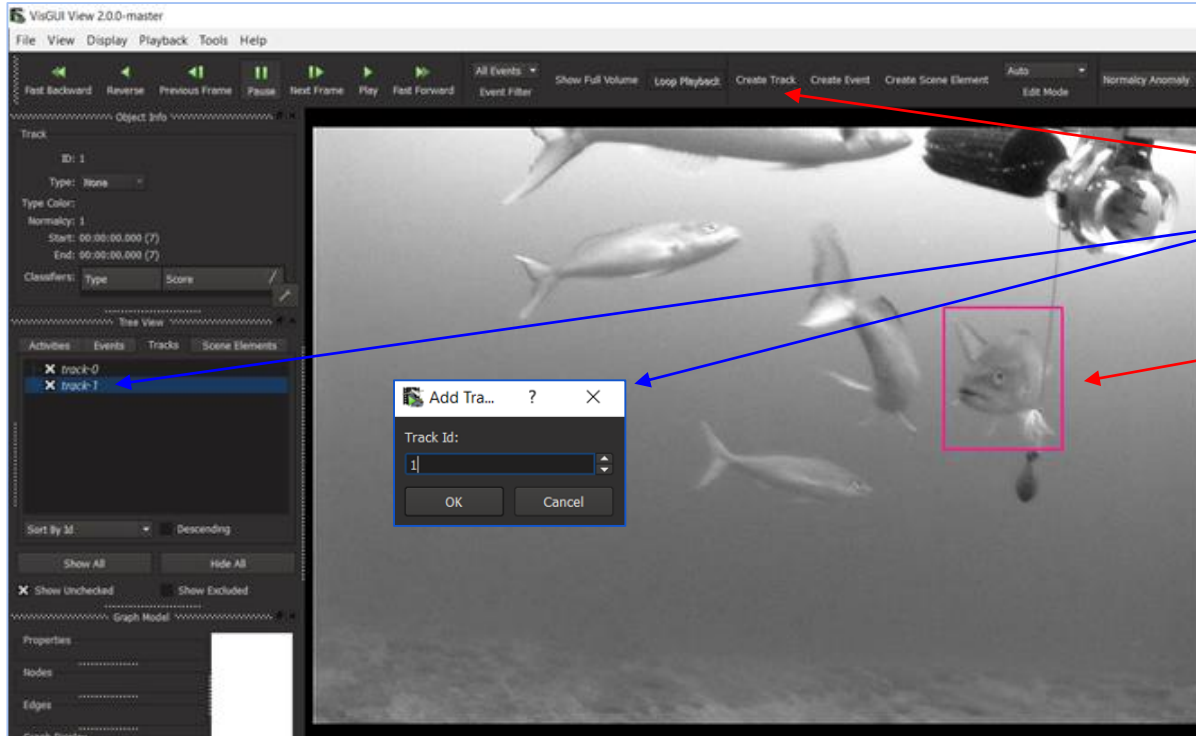
Once the images are loaded, tracks must be created.

1. Click the "Create Track" button.
2. Number your track. The actual number is not so important (e.g., 0, 1000, etc.).
3. Select the object to track by clicking it and adjusting the box's size OR holding ctrl and drawing the correct size box.
4. Go to another slide and select the same object.

Creating a single frame track
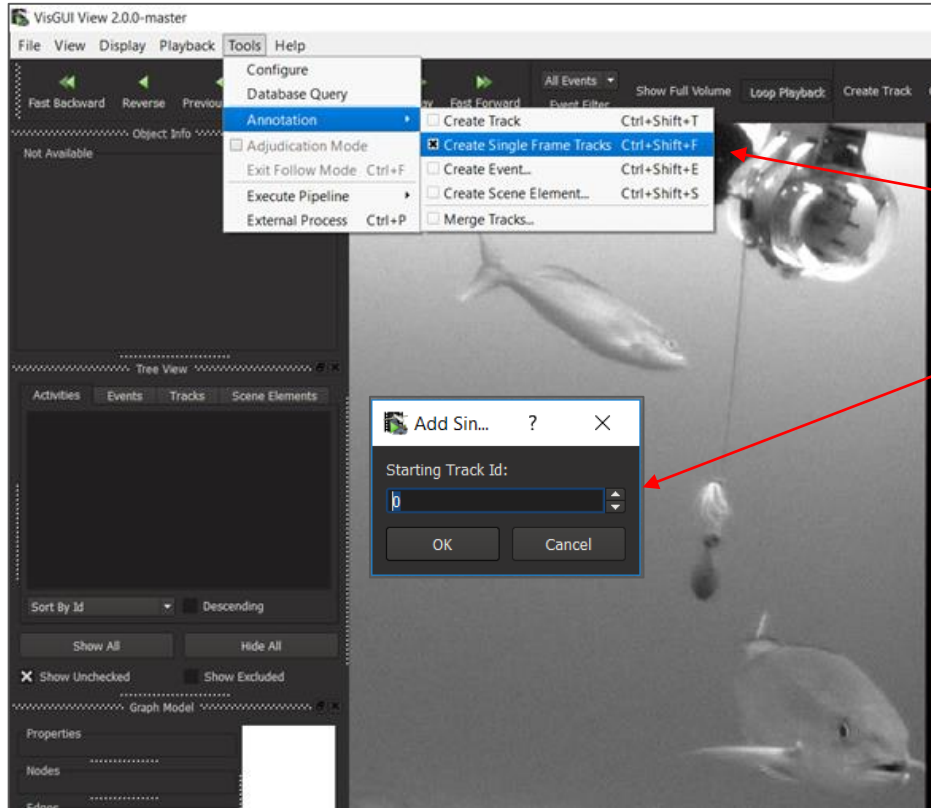
It is possible to create multiple tracks in multiple frames without having to select "Create Track" each time.

1. Go to Tools ->Annotation
2. Scroll down and select 'Create Single Frame Track'
3. Number your first track.
4. Select the object to track by clicking it and adjusting the box's size OR holding ctrl and drawing the correct size box.
5. Select a new object and click it. A new track and track number should appear.

The track creation process will stop when a user right clicks on a box.

Creating a track and interpolation (the double-edged sword)


0001

0020

0040
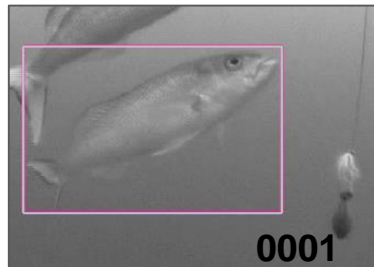
VpView will linearly change the position and size of the bounding box for frames between frames where the object was selected.

Frames in which the box was drawn is indicated by a **bolder light blue box**. And the frames filled in between are indicated by a light pink box.
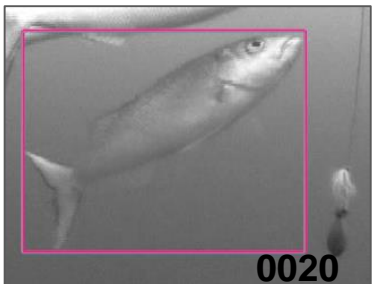
Some of the intermediate boxes created by the software will need to be adjusted to tightly indicate the tracked object.

To delete manually drawn boxes, hover the mouse over the box and press "Delete".
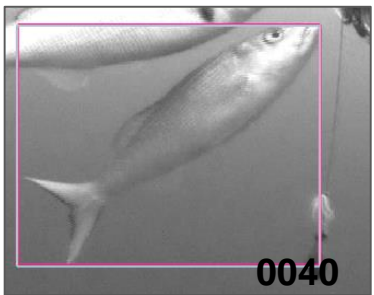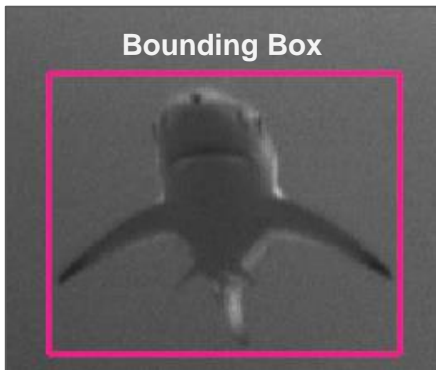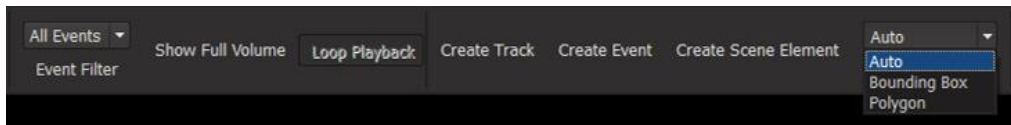
When finished annotating the entire track, stop editing by right clicking on the track label and selecting "Stop Editing Track" OR right clicking anywhere in the image.

To resume editing an existing track, right click on the track label and select "Edit Track" OR right click on the box of an existing track.
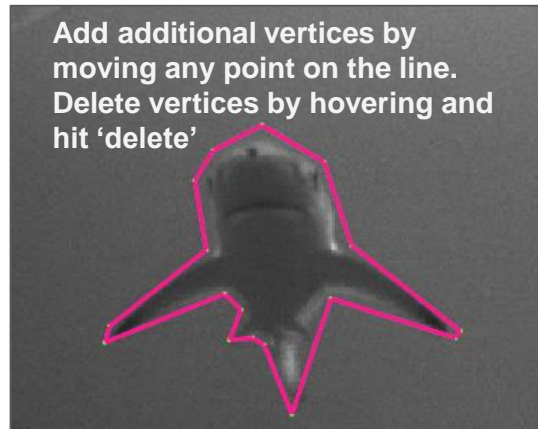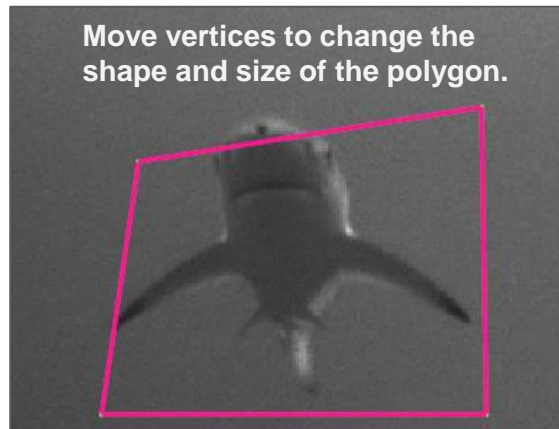
Remember to save often.

Bounding Boxes vs. Polygons
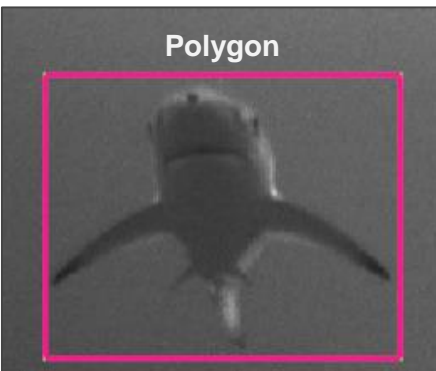
The default track uses a bounding box. This is usually sufficient for creating tracks of objects. Alternately, an annotator may use a polygon. A polygon is useful for creating scene elements.

Notes:
- Polygons must maintain the same number of vertices for entire track.
- If you want to reset to a rectangular track, switch to a bounding box and then back to polygon.

Bounding Box

Polygon

Move vertices to change the shape and size of the polygon.

Add additional vertices by moving any point on the line. Delete vertices by hovering and hit 'delete'
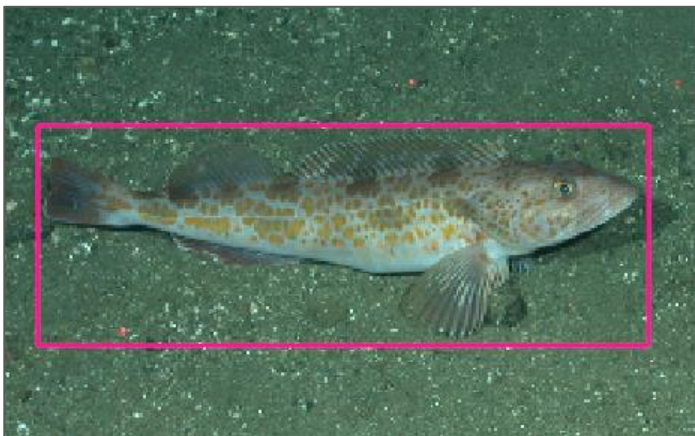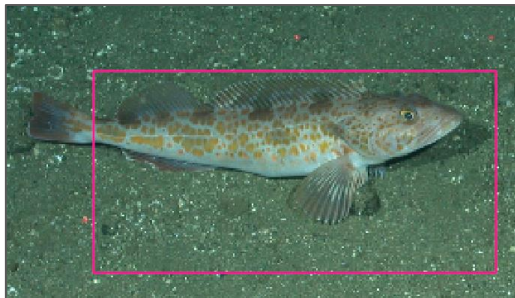
When to correct bounding boxes.

The goal is for the center of bounding box to remain over the center of tracked object without clipping too many extremity pixels.

Attempt to avoid dramatic box size changes that aren't associated with an object's movement or overly large boxes.
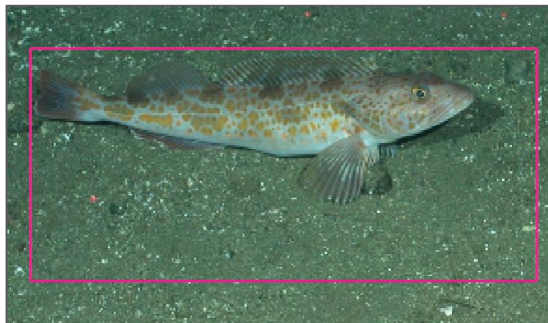
Good Bounding Box.
No need to fix.

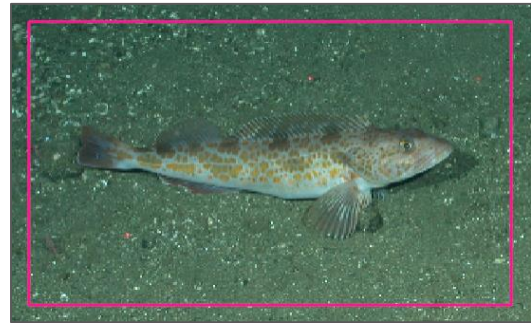Off center and excluding large portion of fish.

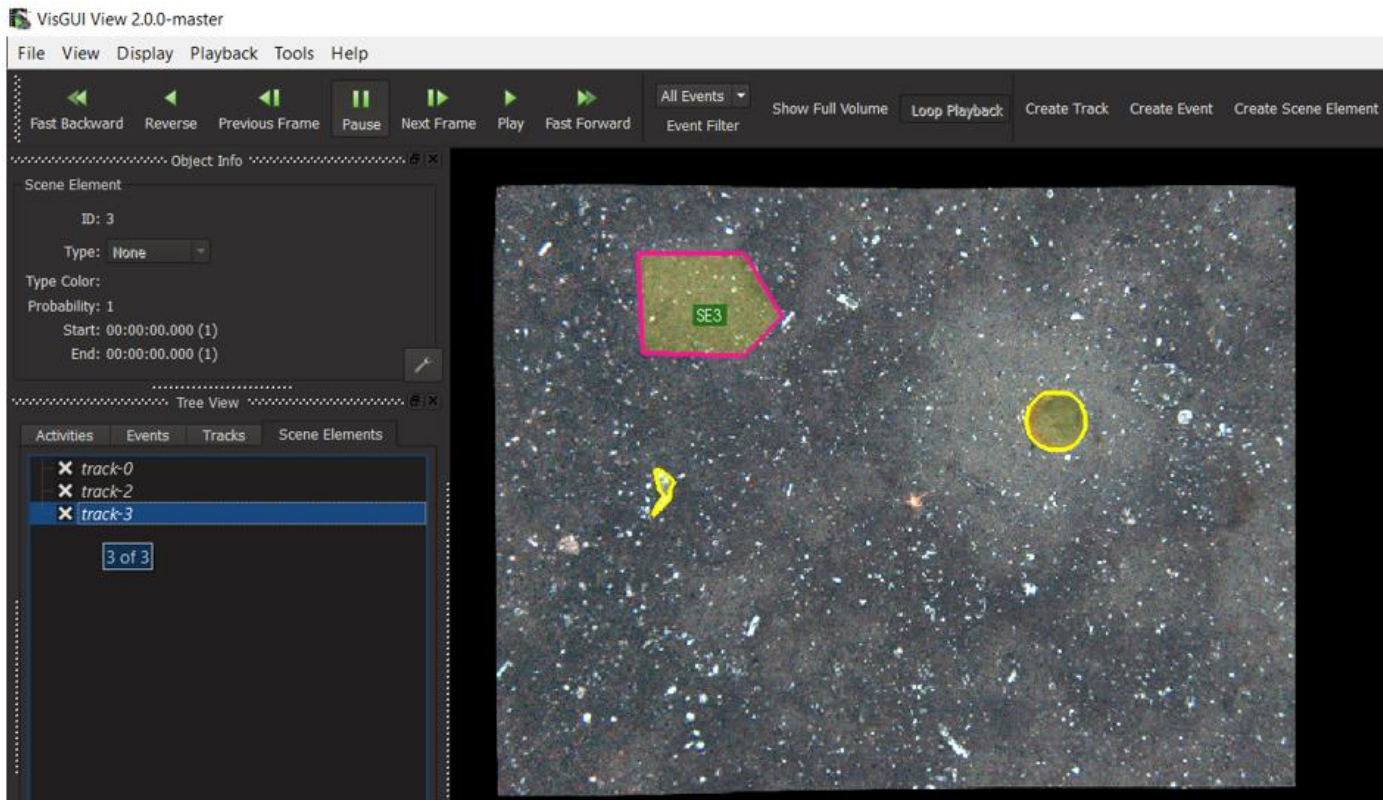Excluding large portion of fish.

Off center bounding box.

Bounding box is too large.

Annotating Scene Elements

Note: The colors of boxes are user defined and don't translate between computers.
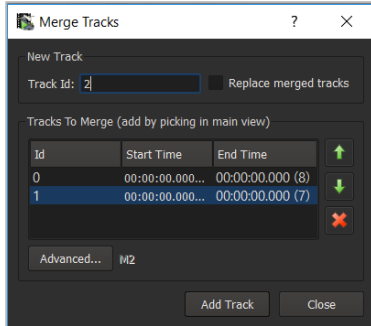
Helpful Tips:

ZOOM:
- Draw box
- Mouse Scroll Wheel
- "a" zooms all the way out
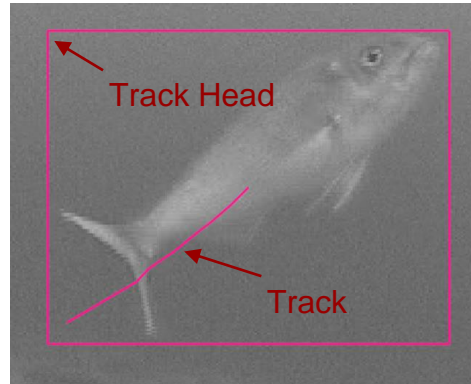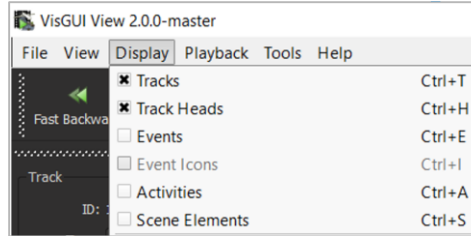
PAN:
- Hold "Shift" and drag image.

Merge Tracks
Tools -> Annotation -> Merge Tracks

Click on the track or track head itself to add to merge list.

Display Tracks and Shortcuts

- Ctrl+H -> Show/hide track bounding boxes
- Ctrl+T -> Show/hide tracks
- Ctrl+S -> Show/hide scene elements
- Ctrl+E -> Show/hide events
- Ctrl+Shift+T -> Create new track
- Ctrl+Shift+S -> Create new scene element
- Ctrl+Shift+E -> Create new event
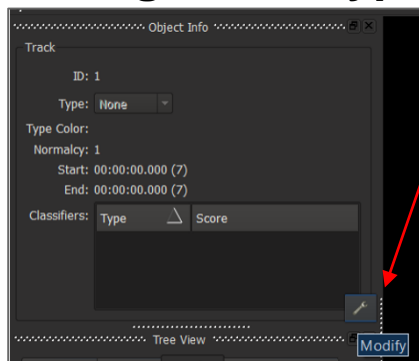
Helpful Tips:

Auto Advance Frames

The program's default is set to automatically move to the next frame when a track is created. To disable this feature:

1. Go to Tools -> Configure
2. Select User Interface
3. Deselect 'Auto change frame during track (or FSE) creation'
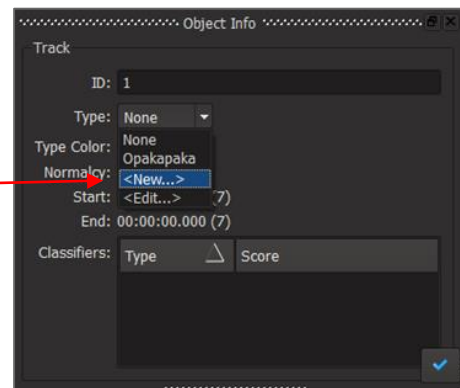4. Select 'Apply' and then 'OK'
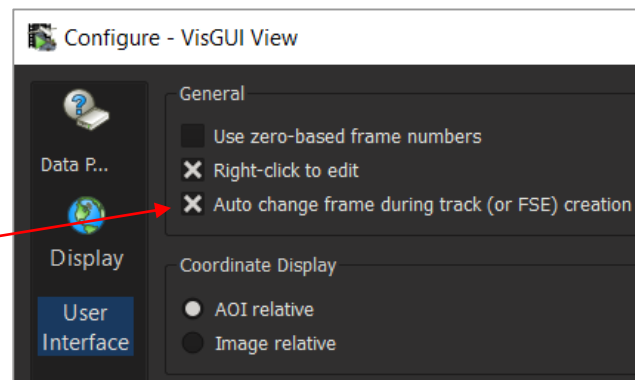
Adding Track Types

New track types can be added from the Object Info box:

1. Select the modify button.
2. Select the dropdown menu for the 'Type' field the scroll down and select 'New'.
3. A dialog box will appear and a new track type name can be entered.
4. Select 'OK' and the new track type name will now appear in the dropdown menu.

Helpful Tips:

Compute Color Range

For loaded imagery, which can be especially useful for 16-bit imagery, you can change the color display range for images. Optimal ranges can be computed either from individual frames or the entire archive.

1. Go to Tools -> Configure

2. Select User Display

3. Under 'Color Window Width/Center', select 'Compute'

4. Determine if the range will be computed for just the current frames or all frames and select the appropriate button.

5. Select 'OK'