# List of modifications done to AnimalTA for the update v3.1.1 and v3.1.2

## Video preparation:

- Possibility to **delete more than one video at a time** in the main table (Shortcut = Shift + Delete).
- When using the "do background for multiple videos", the user will now have the option to **use the same background for multiple videos**.
- It is now possible to **exclude some inside parts of an arena** in which the targets are not expected to be found by creating "negative" arenas. To do so use right click instead of left click when creating an arena. The negative arenas are characterized by points being marked as crosses instead of circles. (see illustration below)
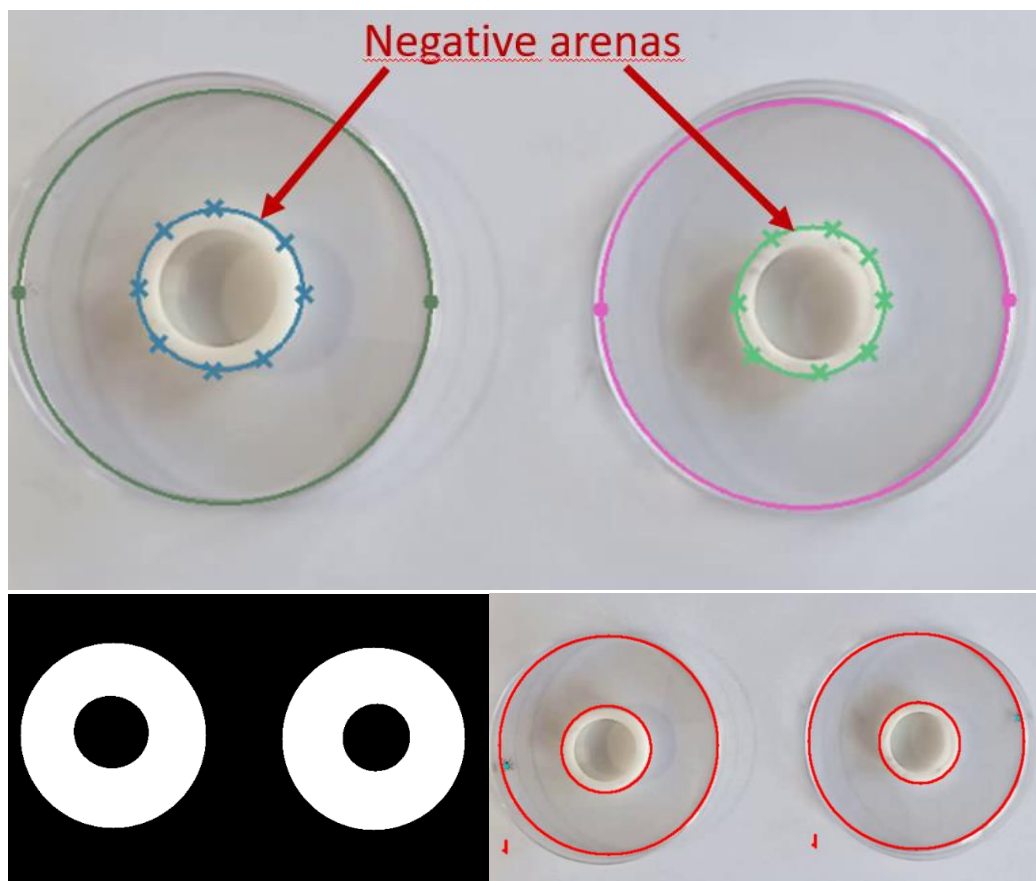


*Illustration of the concept of negative arenas*

- It is now possible to choose **personalized fps**. Click on the fps menu and select the "personalized" option. You will then be able to write down the fps you want.
- It is now possible to apply a **90º rotation to the videos** (in the main table, use the arrows close to the eye under the video name).
- To compensate for **missing metadata** while converting videos, it is now possible to force the program to use the frame rate you want while converting the videos. To do so, select the "Correct metadata frame rate information" option and indicate which frame rate you

want for the videos to be converted, then validate and select the videos you want to be converted, validate again.
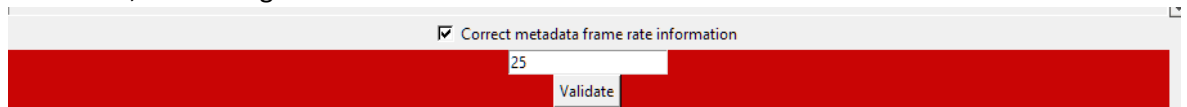


- It was not possible to **fusion two videos with different frame rates**, even if those frame rate were very similar. It is now possible (but the program will show a warning to avoid confusion).
- In the stabilization panel, it is now possible **to remove points of interest in a faster way** by removing everything close to the cursor (the radius may be changed in the options).
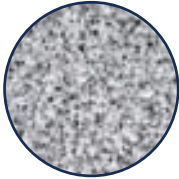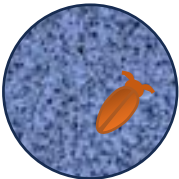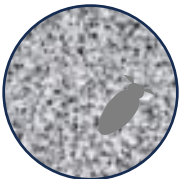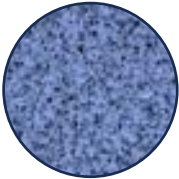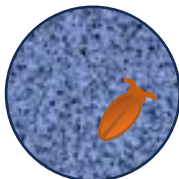
**New tracking features:**

- It is now possible to **track variable number of targets** (i.e. some targets enter/leave the arenas of interest). To unlock this option: in the "prepare tracking" panel instead of choosing the number of individuals inside the arenas like previously, click the "Variable number of targets" button. This will allow you to click a "Redraw entrance area" button. This option must be used to indicate to the program from where the animals are entering/leaving the arena. You can then either draw directly on the image or select the borders you are interested in and then amplify them (see image below). We advise to have entrance arenas of a minimum of 1.5 target body length.
  If the entrance areas are inside the arenas or interest (defined during the pre-tracking settings), you choose to either keep the trajectories or remove them while inside the entrance area by checking the corresponding option is the settings of AnimalTA (top left corner of the main window, the "…" button).
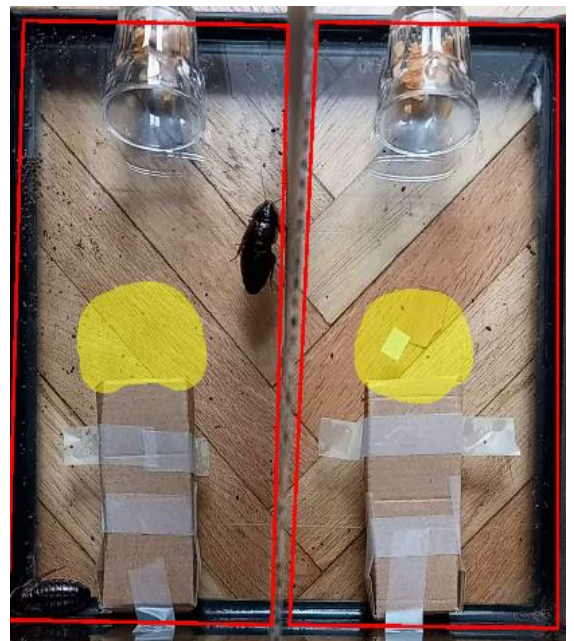


*Illustrations of the entrance areas (here in yellow). In the left image ants are walking up an down a tree, we will track their displacements inside the red rectangle, yellow rectangles are used as entrance area (i.e. the program will use this space to identify incoming individuals but won't keep their trajectories). In the right image, cockroacches*

*can leave the shelter by going throught the yellow area. Here we choose to keep entrance data so cockroaches coordinates will be kept while inside the yellow area.*

- Instead of working with grayscaled videos (as it was before), you can now **keep the video color**. This means that you can track individuals whose color is different from the background, even if grayscaled image would give both background and target the same value (see illustration below). This option can be unlocked by clicking the "P" button in the "Prepare tracking" panel, "Background" row.



| | Background | Video image | Grayscale video image | Background subtraction |
|---|---|---|---|---|
| Grayscaled background | | | | |
| Colored background | | | | |

*Illustration of the difference between color and grayscaled videos.*

- For videos with non-homogenous lighting, it is now possible to make a **relative background** subtraction instead of the original absolute one. This option can be unlocked by pressing the "P" button in the "Prepare tracking" panel, "Background" row. Then select the "Relative difference" option. Illustration below.
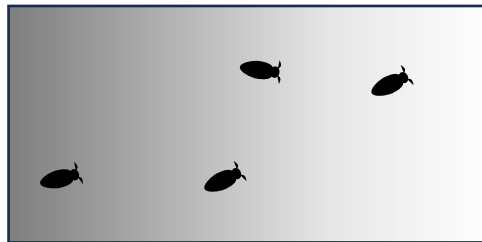
Absolute background subtraction

Original image
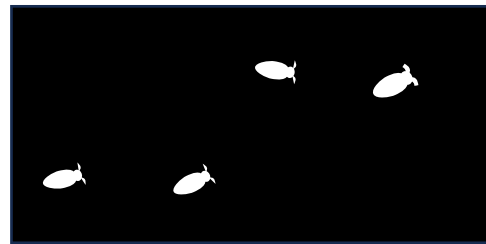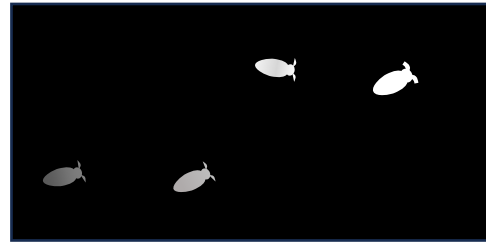
Relative background subtraction

*Illustration of the concept of relative background subtraction*

- It is now possible to use a **Kalman filter** when doing the tracking. This filter uses past known trajectories to calculate a prediction of the next position of a target, using the filter will make the tracking process a little slower but should limit the number of identity swaps in case of tracking of crossing targets. To unlock this filter, go to the settings panel (top left corner of the main window, the "…" button), and select "Use Kalman filter" (before doing the tracking).

### Changes in tracking corrections:

- The **view can be locked** on the position of a target using the "L" key on the keyboard. This option allow to manually correct the tracking in a faster and easier way while zooming in the video.
- The **coordinates table can be open on a separate window**, allowing to have more column and rows displayed (use the ⊡ button in the bottom right corner of the table).
- It is now possible to **redo the tracking of a single arena** instead of all the arenas.
- You can now use **"Ctrl + Z" to cancel the last modifications** done (like Ctrl + Z in numerous other programs).
- You can copy and paste coordinates from the coordinates table using "**Ctr + C" and "Ctrl + V"** shortcuts.
- It is now possible to **fusion the trajectories of two targets** by selecting one, then hold "Ctrl" + "Shift" keys and click on the second one. The missing trajectories of target one will be replaced by coordinates of the second target and the second target will be deleted.
- In the data table, it is now possible to **manually hide/show some columns** by right click on them. Hidden column's name will appear when you drag you mouse over them.
- It is now possible to **manually add or remove individuals** (button will appear below the table of coordinates).
- It is now possible to **interpolate all the trajectories of all the videos, or in the opposite, interpolate all the trajectory of a single individual**. When selecting the "interpolate" option in the "view and correct track" panel.

- Two individuals from different arenas can now have **similar personalized names**.
- You can now use the "Return" key **to validate a personalized name** for a target, or to focus on corresponding Entry, and use "Tabulation" key to navigate between targets.
- It is now possible to **copy the targets' names and colors** between videos having the same number of arenas and targets by using "Alt + C" on the keyboard.
- In the correction of the tracking panel, if you press the key "A" on your keyboard, the **arenas' names and location will be displayed**.

## Changes in analyses:

- **Sequences** related to objects can now be identified as **1st, 2nd, 3rd... entry/exit**, instead of only first entry and last exit.
- The **beginning and end of the sequences is now saved** in the Results files.
- **Possibility to separate video analysis by sequences**. In the analysis section, there is now a new "separate into sequences" option. In this panel, each target is associated with at minimum one sequence. The sequence indicates which portion of the video is to be used for the analysis. You can have more than one sequence per target using the "add sequence" button. The sequences beginning and end can be defined using the option menus. Sequences can also be applied to several videos using the "copy for other individuals" button.
- **The absolute time spent in the elements** of interest is now saved, and animals being lost inside an element and found back inside this same element are considered inside the element for the lost duration.
- **The exploration value inside elements of interest** will also be calculated.
- **The information relative to the coordinates of the elements of interest** (point, line, ellipse, polygon...) are now saved in: "Project_folder/ Results/Spatial/General.csv. For each element, you will find information about its centroid position (Center_X, Center_Y), the bounding values in X and Y, the surface of the element, its periphery, and the points used to draw the element.
- **The information relative to the arenas** are saved in Project_folder/ Results/Spatial/Arenas_coordinates.csv, with similar information as above.
- **Possibility to create Heatmap** based on the individual centered exploration data. In the "Exploration" section, under the "individual centered" option, click the "Do individual heatmap" (heatmap of the selected individual) or the "Do combined heatmap" to create a heatmap using trajectories of all individuals of the arena.

## Other ergonomic and esthetic changes:

- Possibility to **export more than one video at a time**.
- There is now **an automatic save of the open project every 15 minutes**. The autosave file is stored in "My_installation_folder/AnimalTA/Files/Autosave", after 30 days of non-utilization, autosaved files are destroyed.
- AnimalTA is now available in **dark mode**. To apply it, go in the options ("…" button in the top left corner) and select "Dark color".
- If the **project folder or videos are not located in their original location**, it is now possible to indicate to AnimalTA where these elements are located.
- The information panel now comprises a **shortcuts summary**.

- It is now possible to **Zoom-in a video by holding Ctrl + click** and drag the mouse over the video. A dashed rectangle will appear, it will be white if Zoom-in is possible, red if impossible (if the rectangle is too small or is out of the video).
- A **table summarizing for each video which steps have been done** can now be accessed under the main table.
- **Possibility to use the "del" key** on the keyboard to delete the selected video in the main table.
- The **icon of the program** will now appear in Windows taskbar while using it.
- It is now possible to **reorder the videos**. You can change the position of the selected video using the arrows located at the left and right of the summary table (under the main table).
- For the individual centered exploration analysis, a dark circle will now show **how much the exploration surface represents** around the target.
- For videos with less than 1 image per second, the **Video Reader will automatically play the video at a frame rate of 1fps** (this will be indicated by the speed color changing for red).
- Possibility to **make AnimalTA a low priority process**. According to your computer characteristics, it might happen that AnimalTA's process is slowing down the computer for other tasks. You can use the "Set AnimalTA to low priority" in the settings panel to avoid such slow down. The counterpart is that AnimalTA's analyses will be slower when you are doing other tasks.
- In the correction of the tracking panel and analyses, if the displayed trajectory included the start/end point of the trajectories, **start/end of trajectories will be indicated** by respectively green/red circles.
- You can now **save the images of the background/arenas** as a .png file.
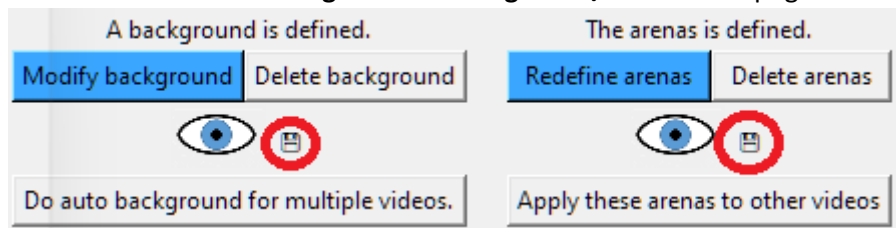


- It is now possible to **display all the trajectories at the same time in analyses panel**, like in the correction of trackings panel.
- In the main panel, **videos names are fixed** and will still be visible while moving the horizontal scrollbar.
- In the video reader, the timeline bar now allows to **easily go to the first frame** by click and drag (if the cursor is dragged below 0 of after the end of the video, the minimum/maximum values will be kept).