The Tutorial for Interactive Annotation Tool for Traffic Surveillance

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This tutorial is to demonstrate the usage of the Interactive Annotation Tool for Traffic Surveillance (iATTS), which is a semi-automatic annotation tool to help collect the data for vehicle recognition and tracking, as well as traffic flow analysis.

Note:

The annotation results will be saved in an XML file (video_filename_output.xml) located in the same directory of the annotated video. This file will save the operation of users.

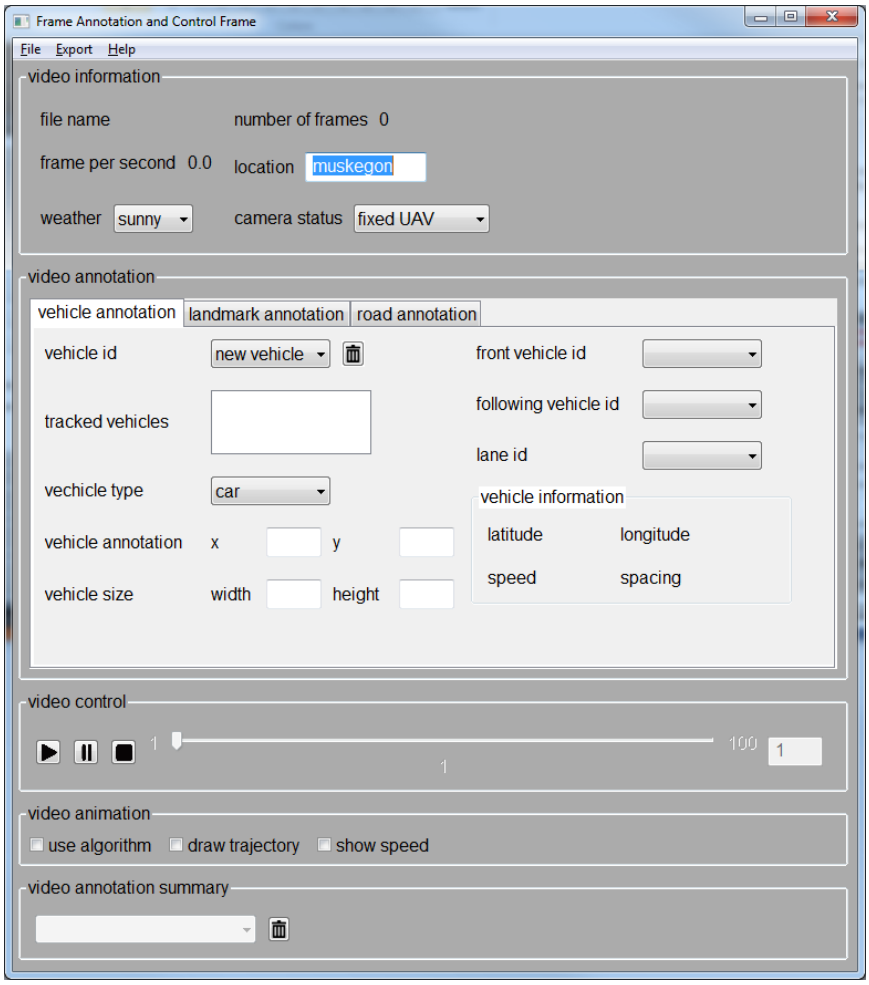
The generated results will be saved in (video_filename_generated_output.xml) located in the same directory of the annotated video.

These two files will be generated automatically by the tool. **These two files are the results we need**.

Tutorial:

1. Graphic User Interface (GUI) Introduction

The GUI of iATTS is divided into 4 parts: Video Information, Video Annotation, Video Control and Video Annotation Summary.



Video information displays the information of a video, including file name, number of frames and frames per second. Some information such as location, weather and camera status can also be annotated.

Video annotation is used to annotate different objects in the video. For now, we can label 3 kinds of objects. One for vehicle, which is the main purpose of this tool. One is for landmark, which is important to get the geo-information of vehicles. The last one is for road, which is used to identify the area of collection data.

Video control is used to play, pause and stop a video. Playing a video means to let a video play one frame by frame. Pausing a video means to let a video stop at one frame. Stopping a video means to let a video go back to the first frame. The slider is used to pinpoint the video, and current frame index will be displayed in the text box besides the slider.

Video Animation is used to control the information shown on the screen when playing the video. There are 3 choices at present. “use algorithm” means using a model-free algorithm to identify vehicles on unannotated frames. “draw trajectory” means drawing the vehicle trajectories on the screen. “show speed” means showing the vehicle speed on the screen.

Video annotation summary is used to show all annotated frames for a **specific vehicle**.

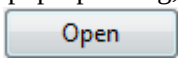
To get traffic data from videos, we need 5 steps:

1) Landmark annotation
2) Road annotation
3) Vehicle annotation
4) Video animation
5) Export traffic data

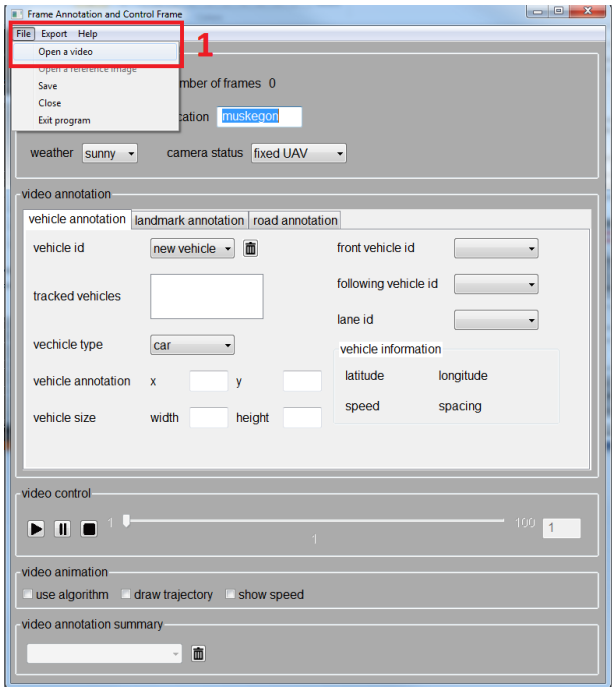
2. File Operation

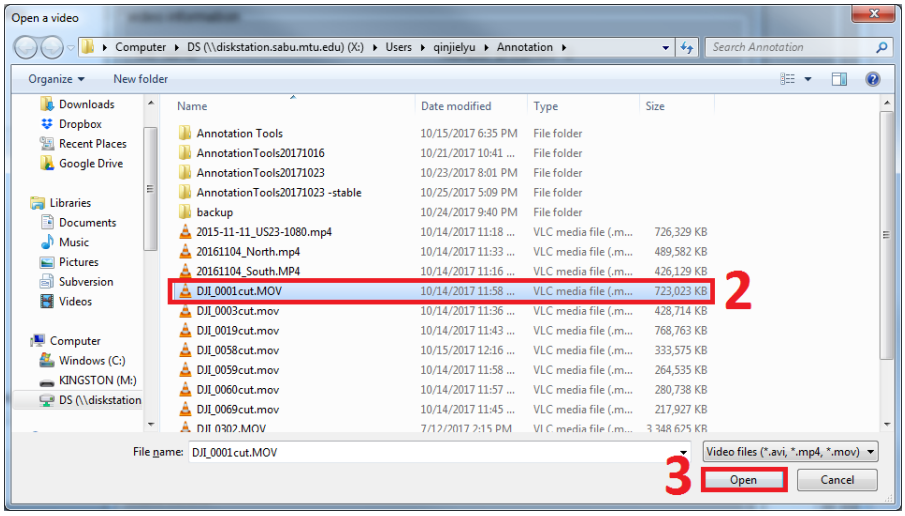
2.1 Open a video

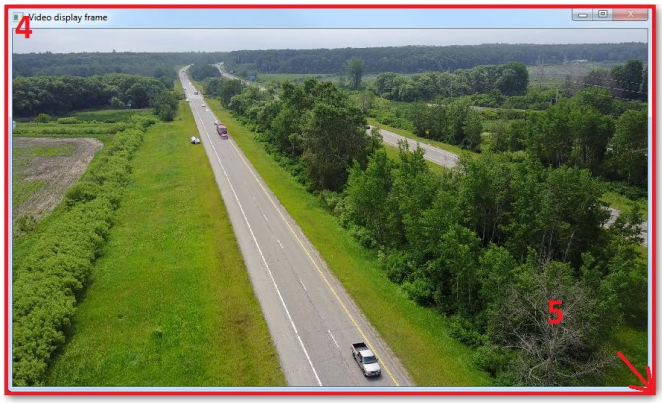
This operation will generate a new XML file (video_filename_output.xml) to record the annotations or open the existing XML file (if the file is already exist) to review the annotations.

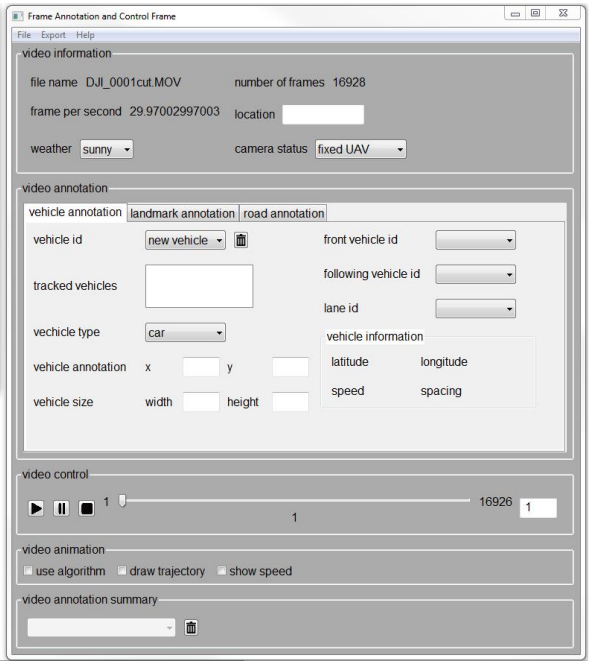
1. Click **File->Open.**
2. In the pop-up dialog, choose a video (for example, DJI0001cut.MOV).
3. Click 

button at the bottom right corner to confirm your choice.
4. Then a new window (**Video Annotation Panel**) will pop up and show the first frame of video.
5. You can drag the bottom right corner of the window to change the window size to fit your screen size.





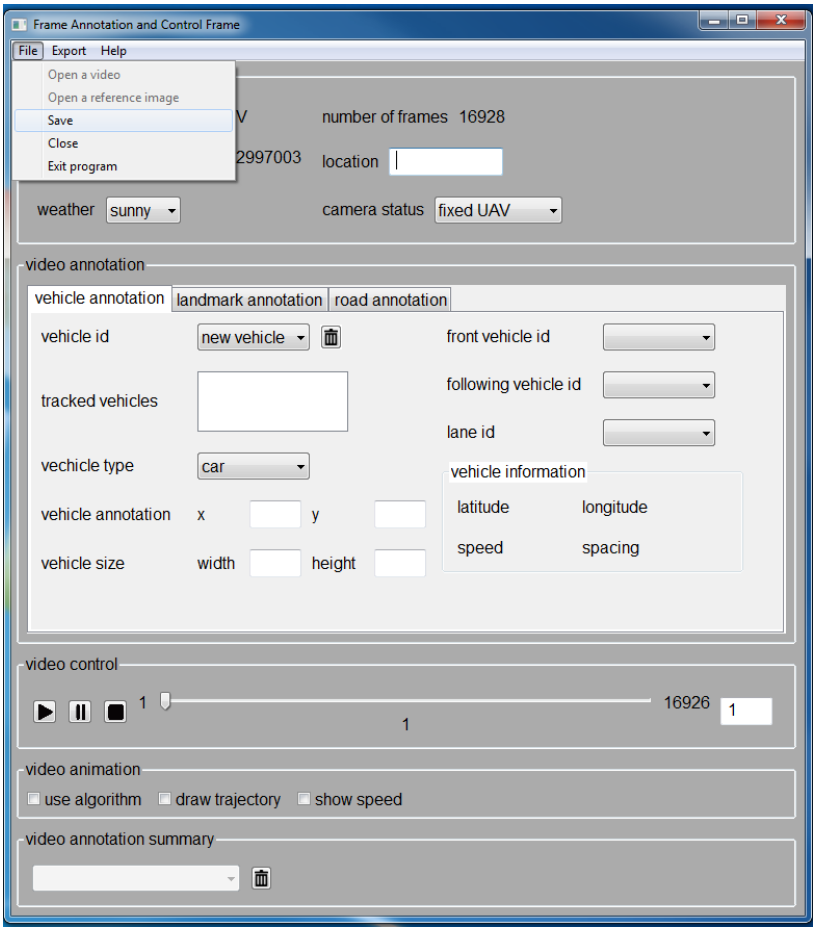




2.2 Save a Video Annotation

This operation will save user's annotation in the XML file.

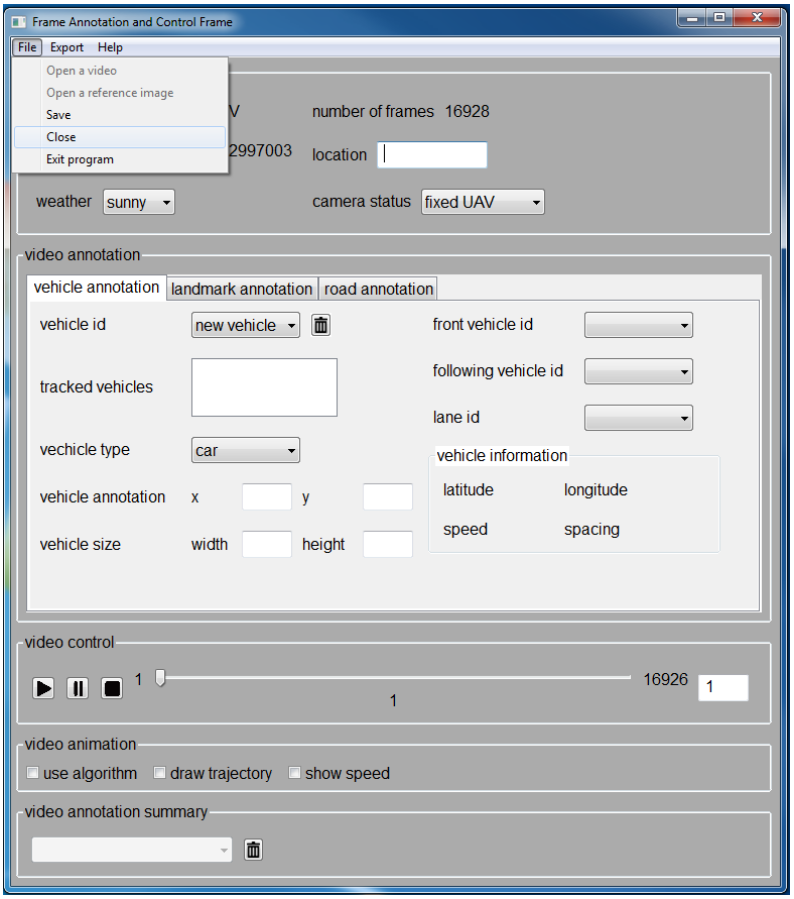
1. Click **File->Save.**



2.3 Close a Video

This operation will close the video and save annotations into the XML file.

1. Click **File->Close.**



3. Video Control

3.1 Play a video

Method1: Click “play” button  in **video control.**

Method2: If the video is paused or stopped, pressing “p” button on the keyboard also makes the video play.

The video will be played frame by frame and the value of slider will increase one by one.

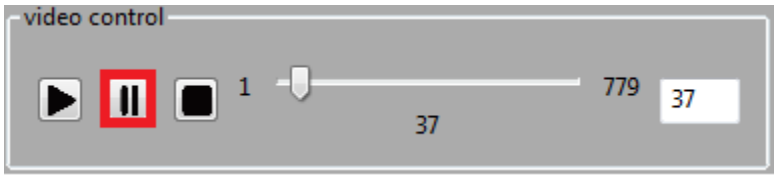
3.2 Pause a video

Method1: Click “play” button  in **video control**.

Method2: If the video is being played, pressing “p” button on the keyboard.

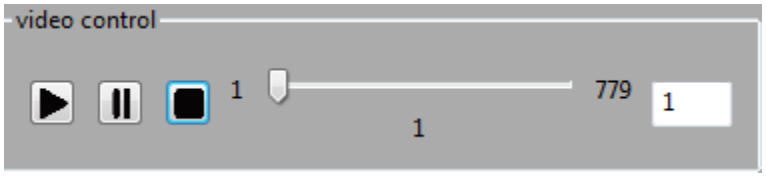
Method3: Click at any position in **Video Display Panel.**

Method4: Drag the thumb of slider.



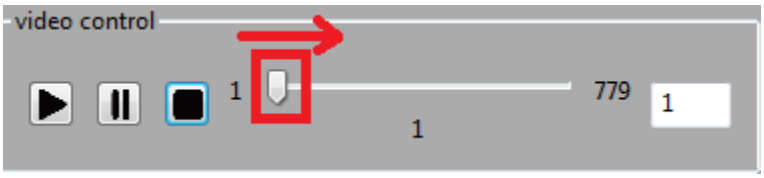
3.3 Stop a video

Click “stop” button  in **video control,** then the video will go back to the first frame. The slider will be reset to the initial position.



3.4 Fast-forward\fast-rewind a video

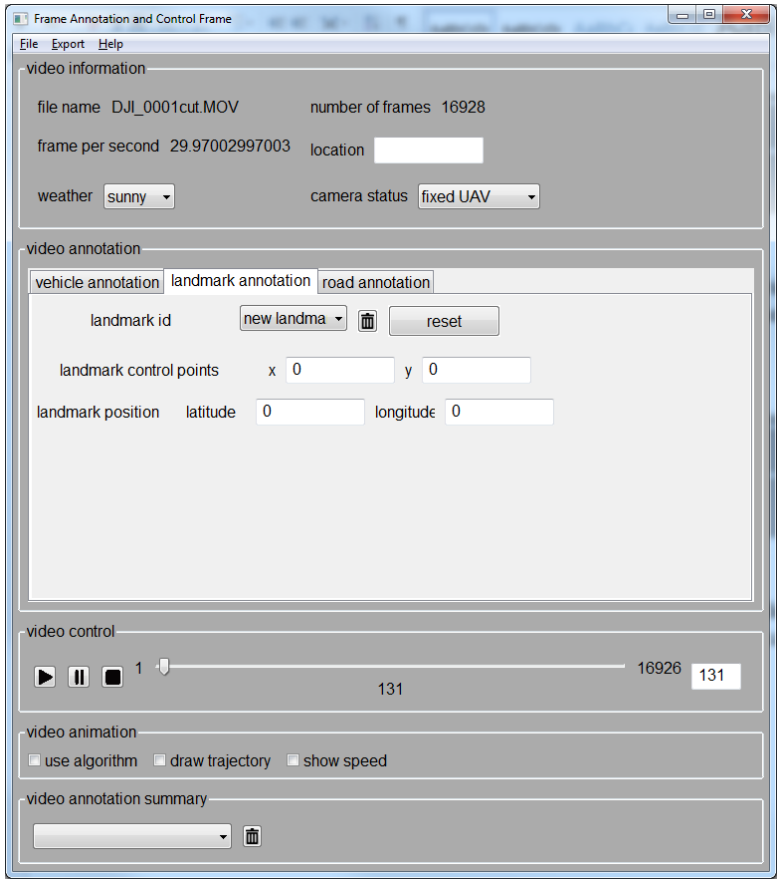
Method1: Drag the thumb of the slider to the position, and the video will jump to that frame.
Method2: When the video is paused or stopped, typing the frame number in the text box besides the slider, then pressing “Enter” on the keyboard.



4. Landmark Annotation

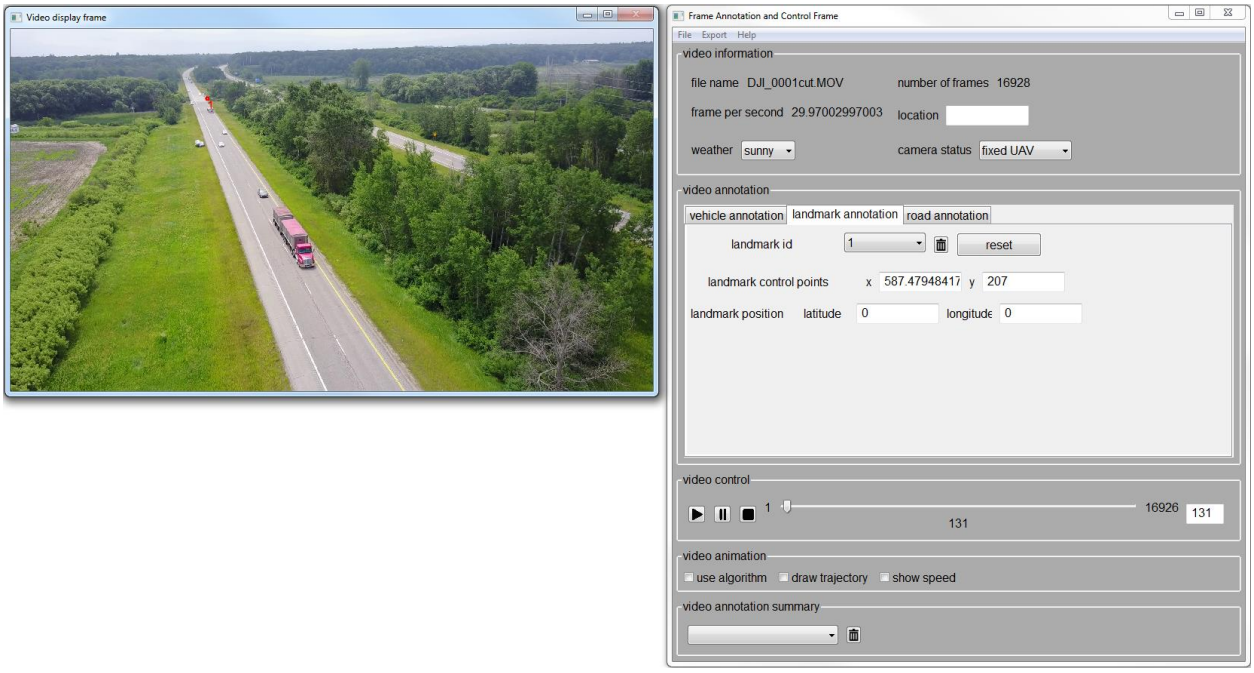
Landmark annotation is used to add geo-information in a video. The geo-information is very important. The quality of landmark annotation determines the accuracy of the results. 4 different landmarks need to be added in the video.

The landmarks need not to be annotated frame by frame. You just need to add landmarks in several frames, an interpolation algorithm will generate the frame between the annotated frames. Only when the video is unstable, you may need more annotations to make the annotation in each frame accurate.

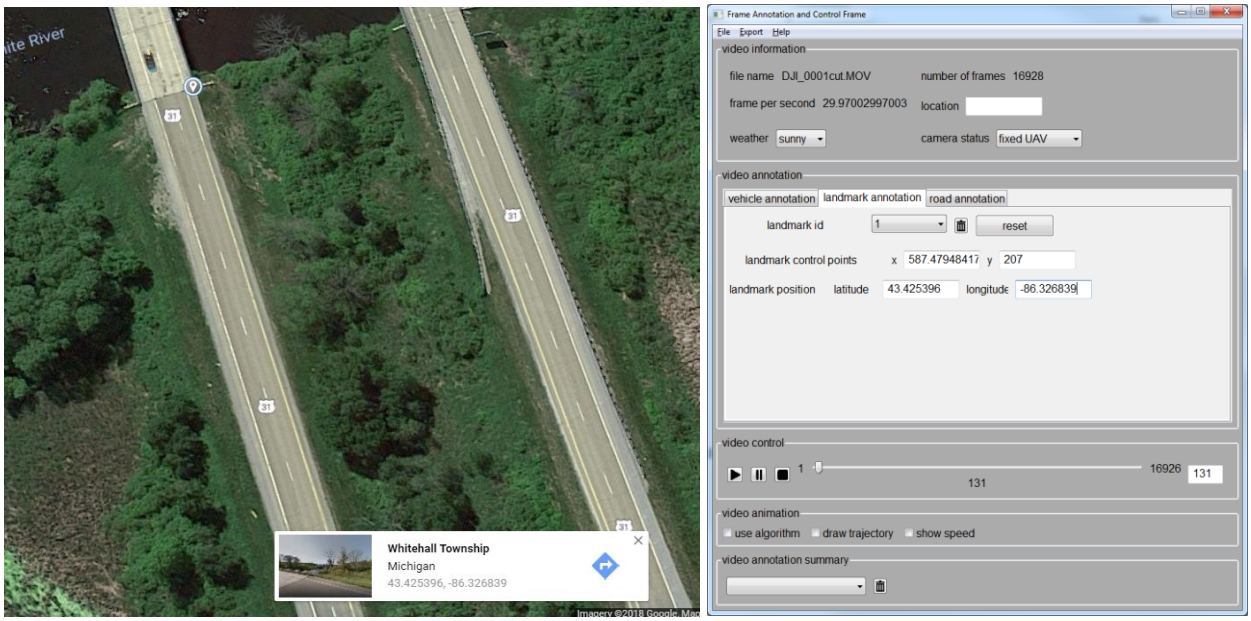


4.1 Add a Landmark Annotation

1. Let the video play according to 3.1.
2. When you need to add a landmark, let the video **paused** according to 3.2.
3. Choose the **landmark id**:
   If the landmark haven't be annotated, choose **landmark id** as "new landmark", otherwise, choose the landmark you want to annotate in the frame.
4. In the **Video Display Window**, choose a point you can get the latitude and longitude, left click at the point and then press Enter button. The position of the point will be shown on **Annotation and Control Panel**, and the landmark id will be shown on the Video display frame.



5. Find the point on google map, and type the latitude and longitude for the landmark in the text box, then press Enter button. An annotation will be added.



4.2 Edit or Delete a Landmark Annotation

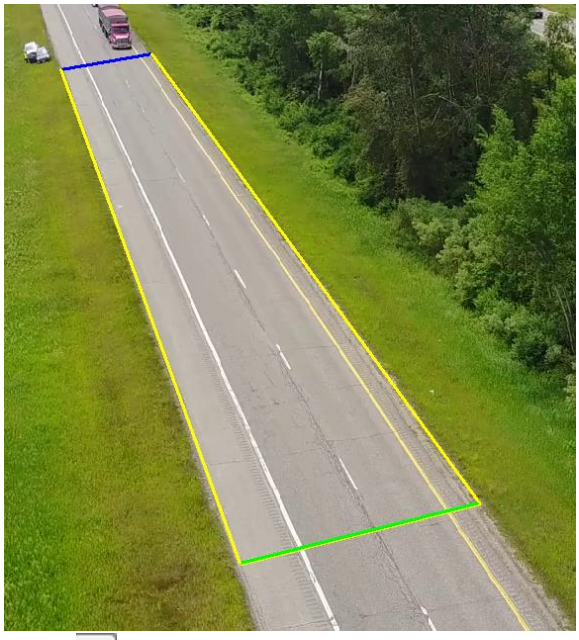
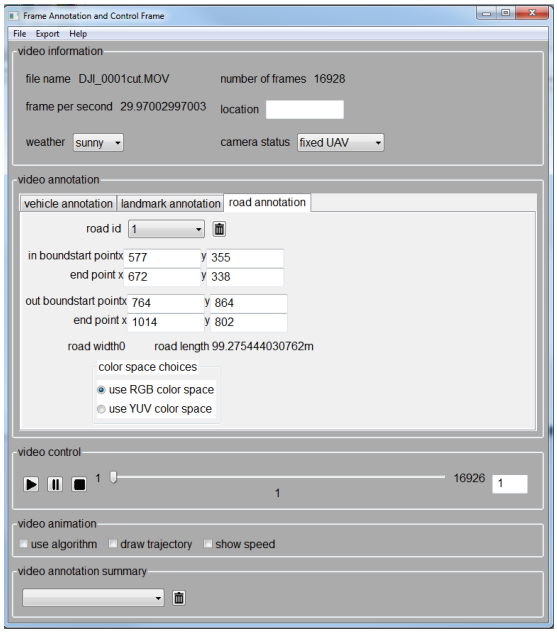
1. Choose the landmark id need to be edited or deleted.
2. If you want to delete the landmark, Click  button in the vehicle annotation page.
3. If you want to edit the landmark, just re-annotate the landmark.

5. Road Annotation

1. Let the video play according to 3.1.

2. When you need to add a landmark, let the video **paused** according to 3.2.
3. Choose the **road id**:
   If the landmark haven't be annotated, choose **road id** as "new landmark", otherwise, choose the landmark you want to annotate in the frame.
4. Add entrance (in-bound) of the road:
   In the **Video Display Window**, click and drag right button of the mouse to draw a line represent the entrance (in-bound) of the road, then press button to confirm the annotation. The road information will be shown on the **Annotation and Control Panel**.


5. Add exit (out-bound) of the road:
   Repeat step 4. After confirm the annotation, the road is shown on the **Video Display Window.** If the landmark information in this video is accurate, the estimated road length will be shown on **Annotation and Control Panel.**

6. Press  , then the road annotation will be generated automatically every 100 frames until the end of the video.

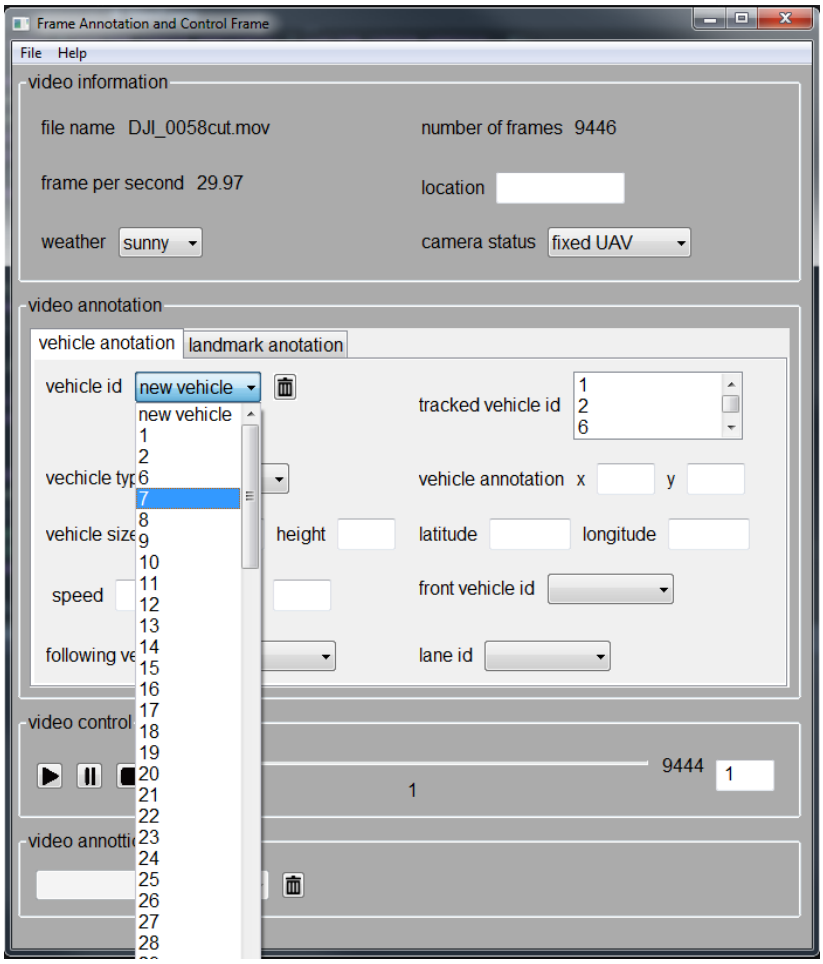
Note:

a. If the annotation is confirmed, press  . If the annotation is not accurate, repeat 3-5 to re-annotate the road.
b. The annotation after the manually annotated frame will be removed. If you revise a annotation for a road in one frame, you need to regenerate the road annotation in the following frames.
c. If the annotation is not accurate, try to change the color space in "color space choices".

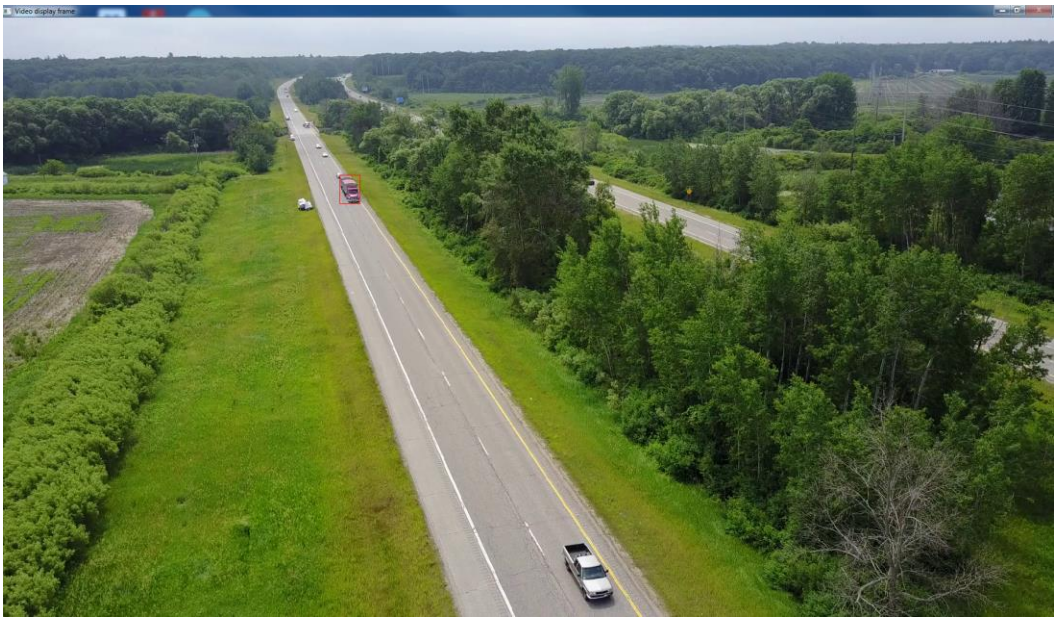
6. Vehicle Annotation

6.1 Add a Vehicle Annotation

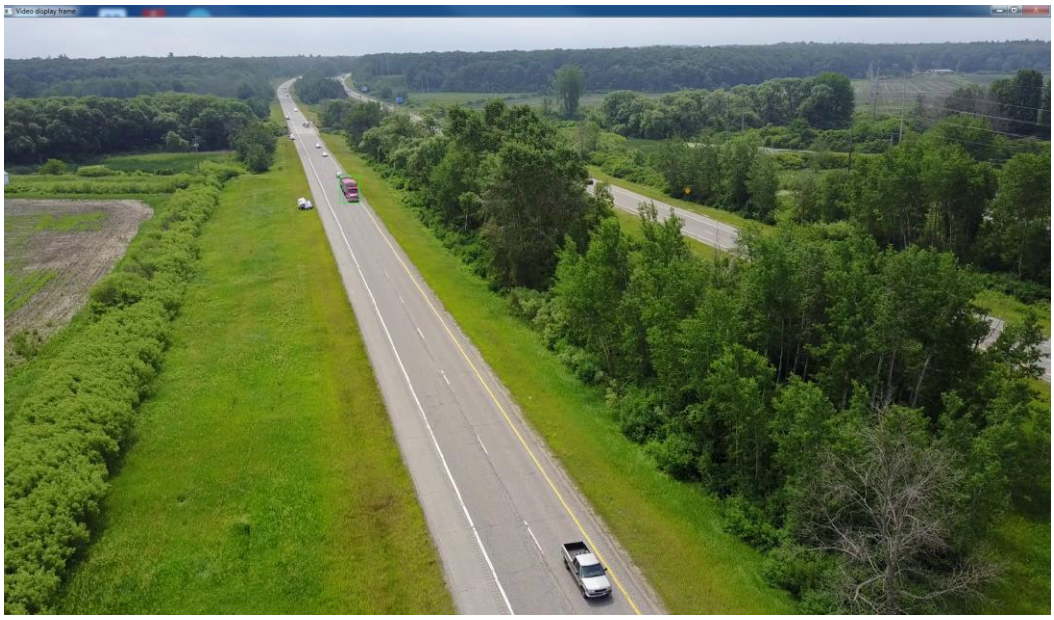
1. Let the video **play** according to 3.1.
2. When you find a vehicle, let the video **paused** according to 3.2.
3. Choose the **vehicle id**:
   a) If the vehicle has never been annotated:
   Method1: Select **vehicle id** as "new vehicle".
   Method2: Press "Space" key on the keyboard, then the vehicle id will change to "new vehicle".
   b) If the vehicle has been annotated:
   Method1: Select the proper **vehicle id** for the vehicle to be labelled.
   Method2: Press "+/=" to make the vehicle id increase by 1 or press "_/-" to make the vehicle id decrease by 1, until it stops at the proper position.



4. Select a start position, drag left click and a red box will appear. Release your mouse until all part of the vehicle has been included in the box.



5. Press “**Enter**” on the keyboard to confirm the annotation, the box will be green.

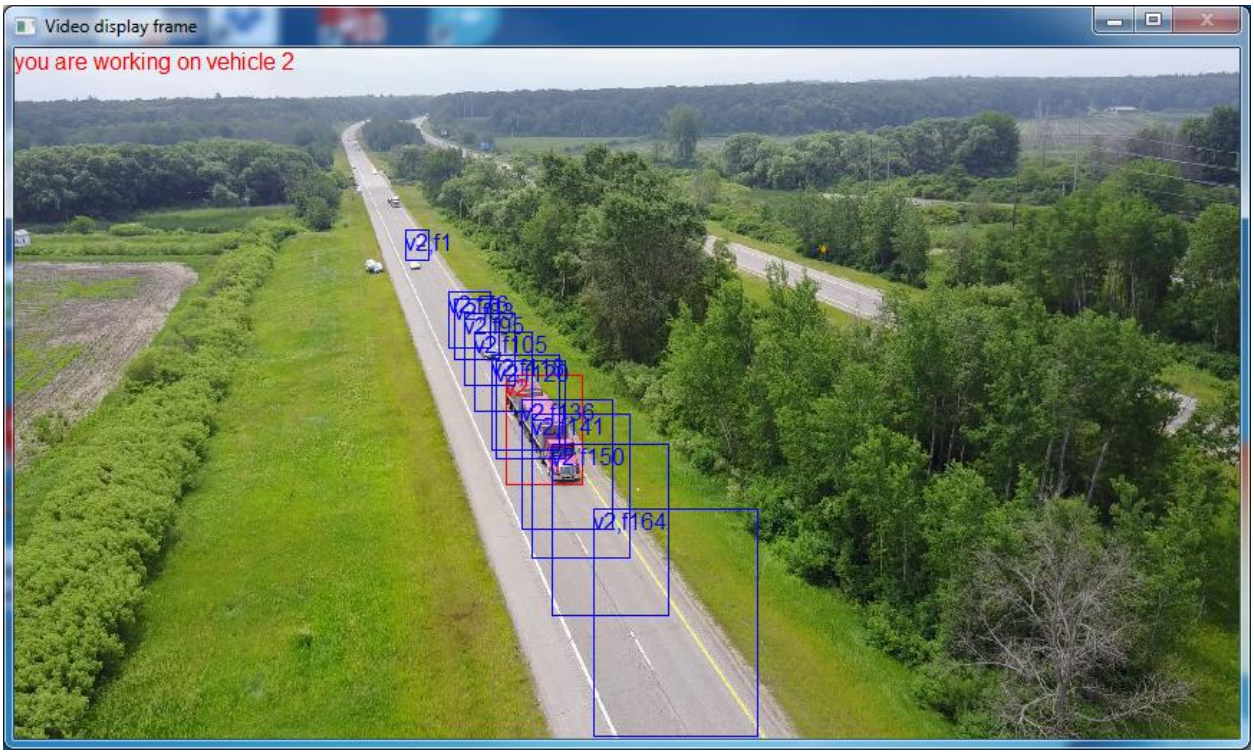


6. If the annotation is wrong, repeat 4 to 5, then a new annotation will be saved.
7. On the GUI, choose the vehicle type for the vehicle. (Vehicle type just need to be modified once).

6.2 Review a Vehicle Annotation

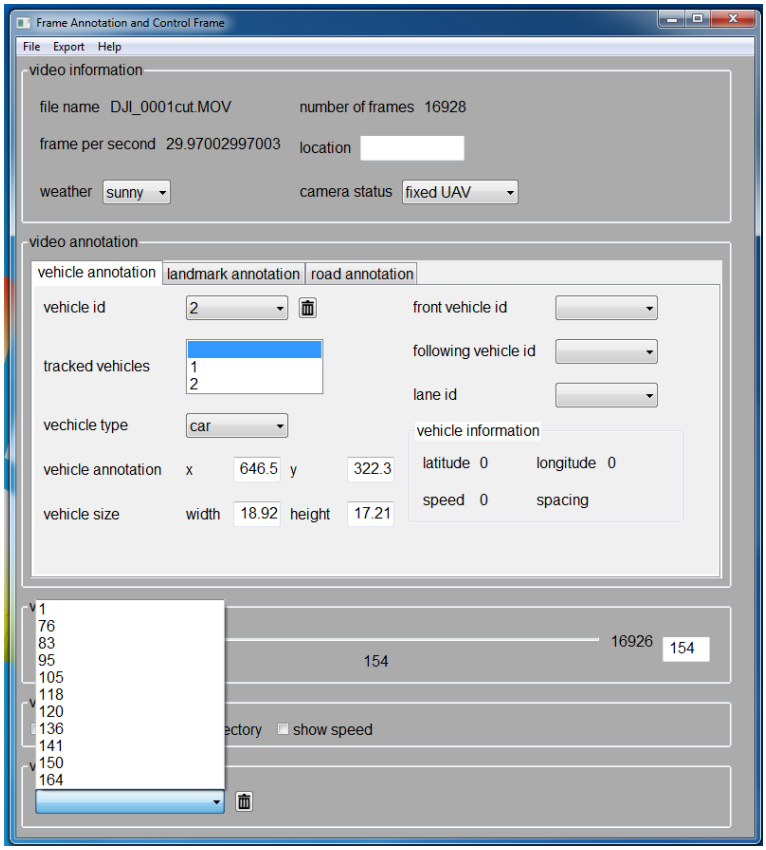
1. Go back to the position before the annotation, let the video play, the generated annotations will for specific vehicles or all vehicles (Use tracked vehicle id to select multiple vehicles, the option will only be effective when vehicle id is “new vehicle”) will be shown on the video. And the vehicle id and frame id will be shown on the top of each vehicle.
2. Pause the video, select the vehicle id as the vehicle need to be reviewed.
3. If the “new vehicle” is selected, then all the vehicles in this frame will be shown on the Video Display Frame.

4. If a specific vehicle is selected, the annotated trajectory of the vehicle will be shown on Video display frame. All the blue boxes are the manual annotation in different frame for the vehicle, the red box is the annotation for the vehicle in current frame.



6.3 Edit or Delete an Annotation

1. Delete all annotations for a vehicle
    d. Select the vehicle id for the vehicle need to be deleted.
    e. Click  button in the vehicle annotation page.
2. Delete or Edit one annotation.
    a. Select the vehicle id for the vehicle you want to delete annotation.
    b. In the "video annotation summary", a choice box will show all annotated frames for the vehicle, and choose the frame need to be deleted and edited.



    c. If an annotation need to be deleted: Click  button then an annotation will be deleted.
    d. If an annotation need to be edited: re-annotate the vehicle in the frame.

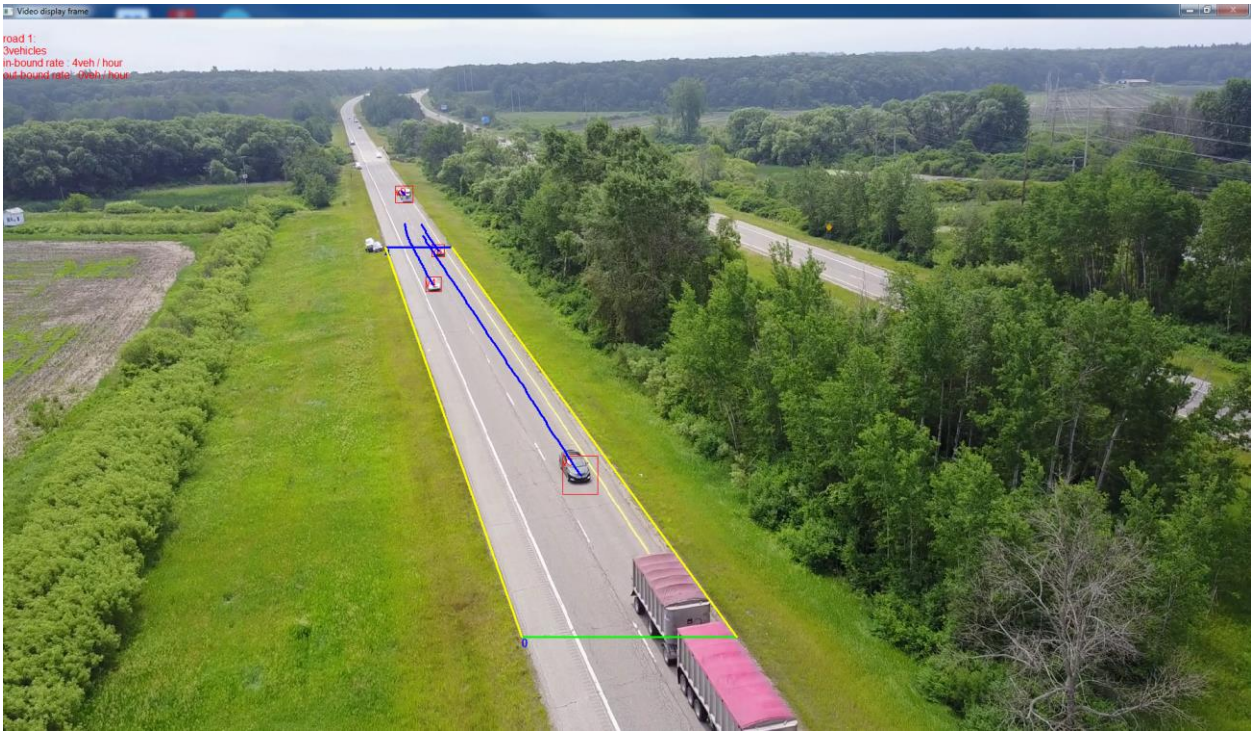
7. Video Animation

Video animation should be conducted after all annotations are finished, and traffic data will be collected automatically during the process.

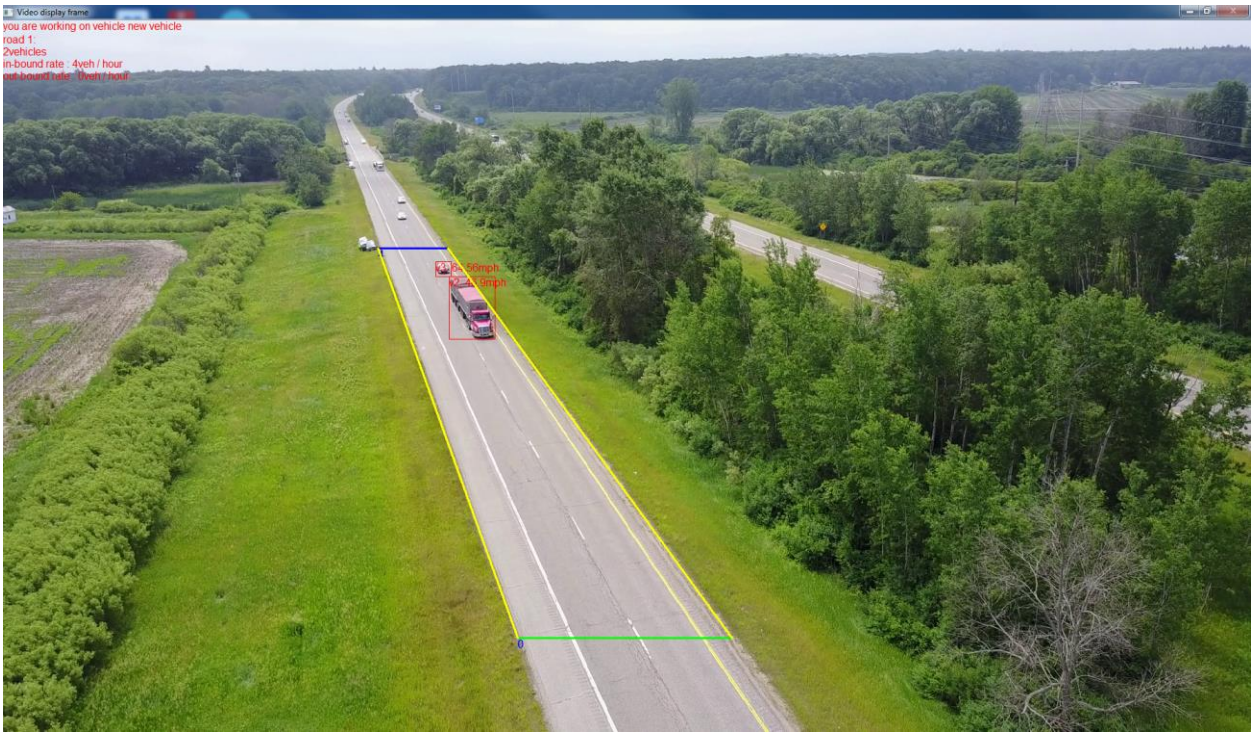
Video animation is easy, go back to the beginning of the video. Then play the video.

You can control the information shown on the screen.

1. Show vehicle trajectory
   Choose "show trajectory" on **Annotation and Control Panel.**



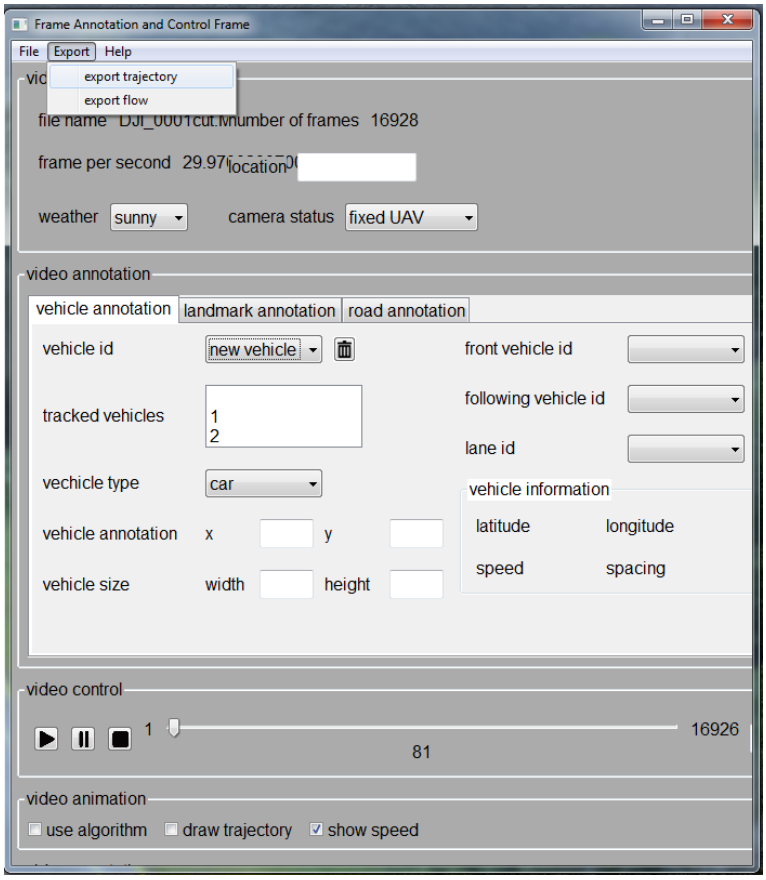
2. Show vehicle speed
   Choose “show speed” on **Annotation and Control Panel.**



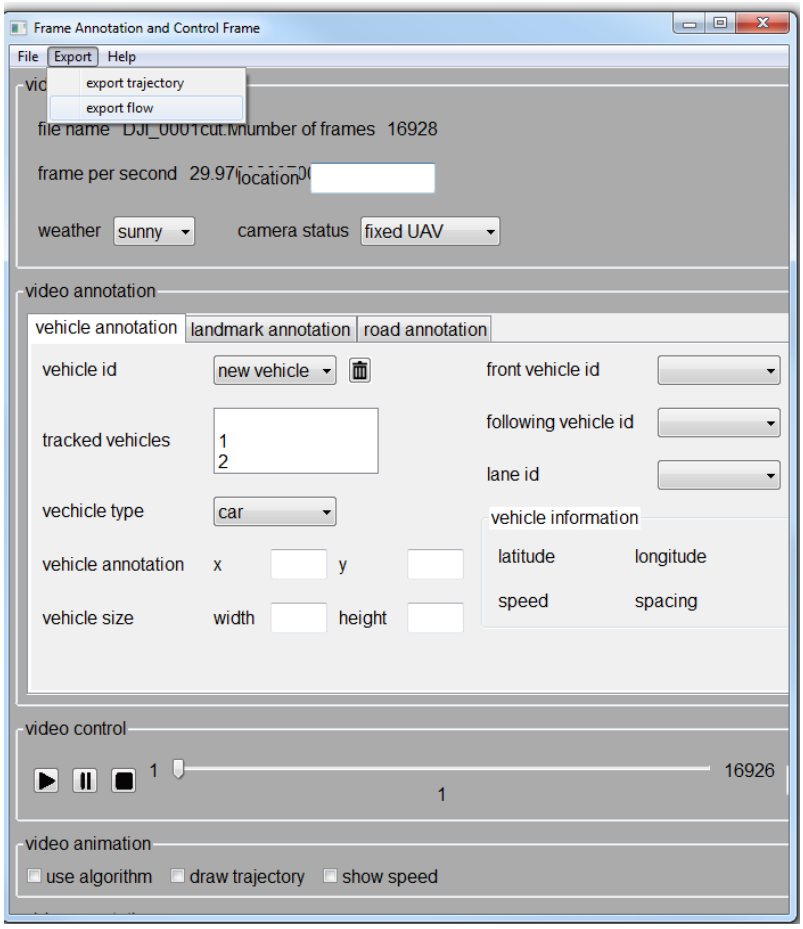
8. Output Traffic Data

After playing the video from the beginning to the end, you can output the traffic data for more analysis. This operation will generate 3 txt files recoding the traffic data.

1. Generate vehicle trajectory: Click **Export-> export trajectory.** (video_name)_trajectgory_export.txt will be generated, and the file can be read by MobileSensorAnalyzer to generate the time-space diagram.



2. Generate flow information: Click **Export-> export flow.** (video_name)_flow_export.txt and (video_name)_vehicle_export.txt will be generated, and the file can be opened in Excel to be analyzed.


Frame Annotation and Control Frame
File
Export
Help
export trajectory
export flow
file name DJI_0001cut.Number of frames 16928
frame per second 29.97location
weather
sunny
camera status
fixed UAV
video annotation
vehicle annotation
landmark annotation
road annotation
vehicle id
new vehicle
front vehicle id
tracked vehicles
1
2
following vehicle id
lane id
vechicle type
car
vehicle information
vehicle annotation
x
y
latitude
longitude
vehicle size
width
height
speed
spacing
video control
1
16926
1
video animation
use algorithm
draw trajectory
show speed