Technical Note

Decoding and encoding video with the GPU

in EthoVision® XT 18

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Why this technical note

This technical note addresses an issue that may be of interest to those who have a previous version of the software (EthoVision XT 17.0 or earlier) and have upgraded to EthoVision XT 17.5 or later.

重要：请仔细阅读文档结尾的中文摘要。

IMPORTANT TERMS

- Decoding: This equals playing back existing video files during tracking.
- Encoding: This equals recording video from a live camera stream.

This note is mainly about an issue that occurs when decoding video, not encoding video.

USE OF THE GPU FOR ENCODING AND DECODING VIDEO

As you probably know, EthoVision XT reads information from a video file and uses the pixels values to detect one or more subjects.

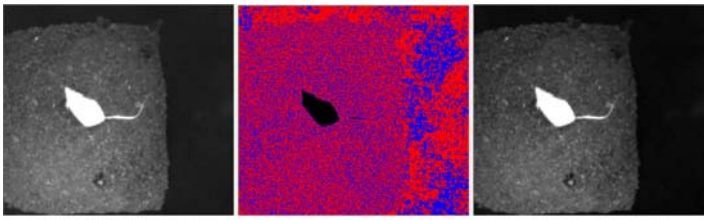
Please note the difference:

- In EthoVision XT 17.0 and earlier versions, encoding and decoding of video is done by the CPU (Central Processing Unit, or processor) of the EthoVision XT computer.
- In EthoVision XT 17.5 and later versions, encoding and decoding of video is done per default by the Graphics Processing Unit (also known as GPU, or graphics card). The reason for this change from version 17.0 to 17.5 is that the GPU allows faster processing of video especially when you work with video of high resolution, or track subjects with the Behavior Recognition function. This reduces the workload of the CPU, and results in greater performance during tracking.

Description of the issue

VIDEO IMAGE

When EthoVision XT uses the GPU to decode (i.e., play back) a video file, the image looks slightly different from what it would do if the software used the CPU for the same task. This difference occurs in some videos, not others. Where a difference appears, it does, the GPU-based image is slightly brighter than the CPU-based image. For example:



EthoVision XT 17.5 (GPU-based) | difference (see text) | EthoVision XT 17.0 (CPU-based)

The figure in the middle maps the difference in gray values between the two images at the two sides. Blue pixels indicate a difference of 17 or smaller, while red pixels indicate a difference of 18 or greater. Black pixels, which in this example cover the entire mouse, indicate no difference between EthoVision XT 17.0 and EthoVision XT 17.5. In other words, EthoVision XT 17.5 and later versions "see" a video file not exactly as what EthoVision XT 17.0 and earlier would do.

EFFECTS OF THIS ISSUE ON DETECTION

If the video image in EthoVision XT 18 (playback with GPU) is not exactly the same as that in EthoVision XT 17.0 and earlier (playback with CPU), the detection settings used in experiments made in EthoVision XT 17.0 or earlier are probably no longer optimal when you use the same video file in EthoVision XT 18.

For example:

- If you use the Gray scale detection method, you may need to change the range of gray values to detect the subject correctly.
- If you use the Dynamic Subtraction method, you need to make a new reference image from the current video and modify the contrast range to detect the subject correctly.

If you are in the middle of an experiment that you started in EthoVision XT 17.0 or earlier, you would need to acquire the new trials with different detection settings. This may not be desirable, right? Because you want to keep consistent detection settings across the trials to reduce the risk of biases in the analysis.

What should I do?

IF YOU HAVE COMPLETED ALL YOUR EXPERIMENTS IN ETHOVISION XT 17.0 OR EARLIER

You do not need to take any further action. Click **Yes** in the window that appeared when you opened the experiment. The experiment is converted to version 18. When you create a new experiment in EthoVision XT 18, the software uses the GPU to play back and record video. Open the Detection Settings and optimize them as usual.

IF YOU HAVE AN OLD EXPERIMENT AND YOU NEED TO ACQUIRE MORE TRIALS

Complete the experiment with the old playback method

If you need to complete an experiment after upgrading to EthoVision XT 18, then you may want to keep using the same video settings as before. This way you do not need to update your detection settings because EthoVision XT will use the old, CPU-based method to handle video. So you make sure that the old and new tracks are obtained with the same detection settings.

Do the following after opening the (old) experiment and reading this note:

1. Click **Yes** in the window that appeared when you opened the experiment. The experiment is converted to version 18.
2. Choose **File** > **Preferences**.
3. Click the **Video settings** tab and next to **Play back and record video** select **CPU**.
4. Click **OK**. You are ready to acquire your trials.

Re-do all trials with the new method

Alternatively, you can acquire all your trials with the new playback method. This means that you have to clear the existing trials, that is, delete the tracks without removing the videos, and re-acquire all trials, while keeping the option **File** > **Preferences** > **Video settings** > **Play back and record video with GPU** selected. For how to re-do trials, see the EthoVision XT Help.

HOW THE GPU OPTION IS APPLIED

The option for enabling and disabling the GPU for video encoding and decoding is applied at the application level. That is, the settings are applied to all the new experiments that you create.

- Make sure that the **Video settings** selection is kept consistent within experiments. That is, make sure that the selection is either CPU or GPU for all the trials in that experiment.
- If you intend to create multiple experiments that are related to each other, we recommend that you keep your selection in **Video settings** consistent across those experiments.

中文摘要

当您升级软件至EthoVision XT 18后，视频默认通过GPU（图形处理器）进行视频解码，而非更早版本中使用CPU（中央处理器）视频

解码。这是EthoVision XT 18的新功能，GPU允许更快地处理视频，同时减少CPU工作负荷。

但由于解码方式的改变，一些视频文件在EthoVision XT 17.5/18中看起来可能会与更早版本中使用CPU时略有不同。因此，您可能需要对检测设置进行调整。

注意，如果您已在EthoVision XT 17.0或更早版本中创建了实验项目，并在EthoVision XT 17.5/18中增加试验采集并分析，您需要在菜单栏的**文件** > **首选项** > **视频设置** > **使用该处理器回放和录制视频**，选择**CPU**。