

EW309: Computer Vision

Capture Test Video and Images

Objective

Record a *sample video file*, of the target for the purpose of developing and testing our image processing algorithm.

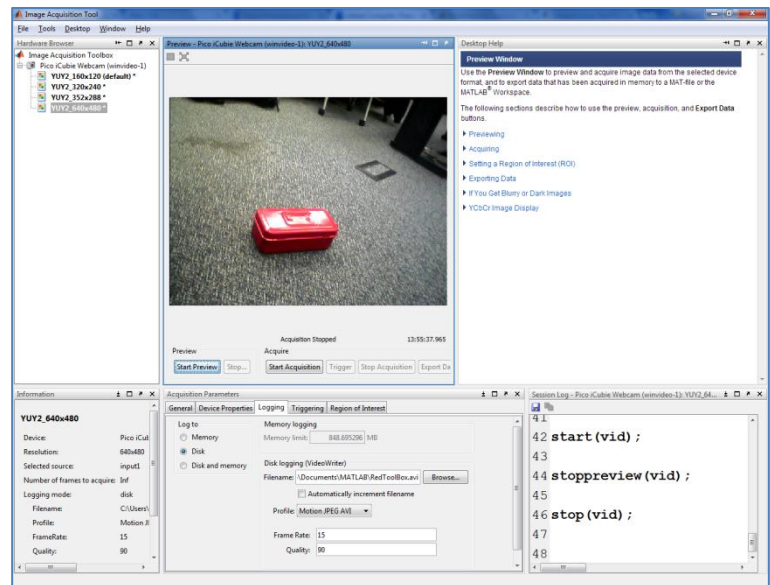
Why a video file?

- You *rarely* want to develop your image processing code using a *live feed* for two reasons. First, it requires you to have the camera and turret with you, and you cannot take that back to your room to work on it. Second, if you alter parameters in your code you will not be able to compare the performance to the old code because the images themselves will be different each time you run it.
- You *never* want to develop your image processing code on a *single sample image*, because it isn't a large enough set of test data.
- When in doubt, use a video!

Step 1: The Camera Plug in the camera to the USB port of your laptop. Wait for windows to confirm new hardware has been installed.

Step 2: View Preview

- Start MATLAB. In MATLAB type
`>> imagreset % force MATLAB to detect new hardware`
`>> imaqtool`
- On the top left pane you see the “formats” our camera can use. Select video format: e.g. YUY2_640x480 is 640 X 480 (about 0.3 mega pixels).
- On the General tab, make Returned Color Space “RGB”
- Now click start preview to see a live feed.



What?!? A 1/3 of a mega-pixel? My phone has an 8 megapixel camera!

8 mp is fine for a still picture but even 1080p HD video is only 2 mp per frame. When the objective is to process the video frames in real time (< 1/30 of a second) high res video is like drinking from a fire hose. Use the smallest resolution that still permits object recognition.

Step 3: Preparing to record video

On the bottom middle pane make these selections

- Triggering Tab: Infinite (which means “until I say press ‘stop’ ”)
- Logging Tab:
 - Select *Disk* (which is really to a file),
 - Enter a *filename* (your choice, with no spaces and no extension)....now press ENTER to access the next options.
 - Select *Profile*: Motion JPEG AVI, then set quality to 90% (you may need to scroll down in the window to get this option
 - Check *Automatically increment filename* (if you make multiple test videos it will call them EW309Test_1, EW309Test_2, etc.)

What is compression?

Uncompressed (.avi) video is HUGE and can fill a hard drive fast. Compression schemes such as jpeg and mpeg alter the original picture to reduce the file size. When your computer processes the images in real time they will be uncompressed. You want your test video to be as similar as possible to the real thing, while not filling up your hard drive. Select 90% quality. Train like you fight...or at least close to it.

Step 4: The video(s).

- Get a 1 ft. diameter *orange* circle and set it up on the easel. Do NOT deface the targets in any way.
- In the top center pane click Start Acquisition. When you are done click Stop Acquisition. **Hint: Keep your videos under 30 seconds long or you risk running out of RAM when you import them. It might be easier to organize your testing later anyway if you make several small video clips (with descriptive titles e.g. Target3meters, TargetLowLight, TargetWithClutter, etc.).**
- Clean up. When you are done go back and delete any videos you don't want to keep. Rename them with descriptive titles if needed.

What makes a good test video? Your video sequence will ideally:

- Be recorded using all the camera settings you plan to use later (e.g. same resolution, exposure, white balance, etc.)
- Depict the object from all the angles you expect to view it from
- Vary over the range of lighting conditions you expect to encounter
- Vary over the set of distances you expect to view the object from
- Include frames which do not display the object at all
- Include the object against a realistic background including any objects which can easily be mistaken for it (e.g. Objects of a similar color but different shape).