SKYE | Object Tracking with SEJITS

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WHAT IS SKYE?

SKYE is a *SEJITS*-enchanced program that uses OpenCV to perform object tracking. While OpenCV has highly-optimized computer vision code, sometimes custom scripts are necessary in object detection; *SEJITS* is used in *SKYE* to optimize these scripts.

OBJECT TRACKING

The primary utility of *SKYE* is as an object tracking system. Originally, the program was a rather basic object-tracking program using only OpenCV function calls. This was fast, but sub-optimal, as shown by the blue bounding boxes in the images below.

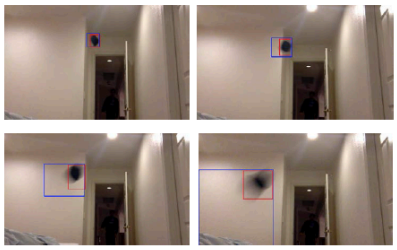

Figure 1. Consecutive frames of *SKYE* processing for a video that features a black sock as the sole projectile. In each image, the blue box corresponds to the object detected by the OpenCV-only algorithm, while the red box corresponds to the improved tracking using the "screener" enhancement.

However, after adding a sobel-based "screener" function, that eliminates the residual difference in the image, and decreases the size of the bounding box, shown in red in the images above.

SKYE PROCESSING FLOW

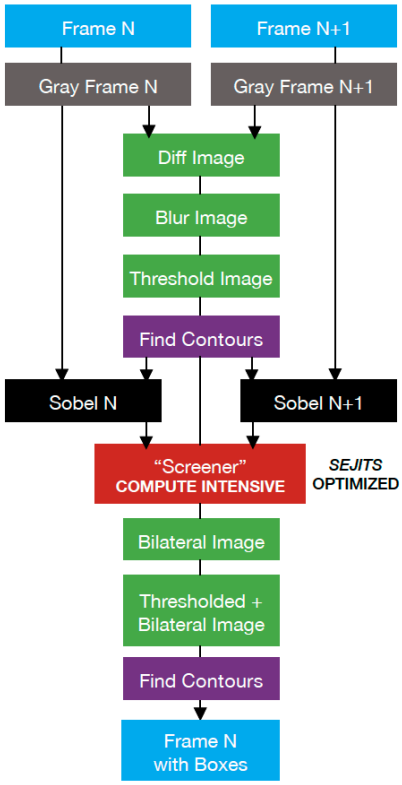

Figure 2. The processing flow for *SKYE*. The compute intensive "screener" function improves detection performance, and does not introduce a significant slow-down when optimized with *SEJITS*.

SEJITS PERFORMANCE

After adding in the custom screener code, there was a significant decrease in performance, as shown by the table below.

VERSION	FPS
OpenCV Only	6.99
OpenCV + Custom	0.392
OpenCV + Custom *SEJITS*	**5.08**

Table 1. The processing speeds, in frames per second of the various versions of development of *SKYE*.

However, after optimizing the screener code with *SEJITS*, there was a noticeable increase in processing performance, as shown by the last entry in the table above.

FUTURE WORK

We hope to make *SKYE* capable of operating on a mobile platform, like a Raspberry Pi. Additionally, we hope to decrease the frame reading time (a major contributor to processing time), to bring this object-detection scheme closer to real-time.

PRESENTERS

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