Alden Kane

CSE 40535

Dr. Adam Czajka

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CSE 40535 Semester Project: Deliverable 1

My semester project is swimmer detection from an underwater camera in a pool. Ultimately, this could be implemented as a feature in a drowning detection system.

I have acquired a data set through (1) collecting video of myself and other swimmers at Rolf's Aquatic Center on a GoPro Hero+ (1920x1080 at 60 FPS). I made surrounding swimmers aware that I was collecting data for a class project. I also (2) downloaded a series of underwater hockey and rugby games from YouTube (1280x720 at 30 FPS). This allowed me to get a more diverse set of training data, with swimmers of different skin tone, shape, sex, and movement patterns.

In total, I have 271.5 minutes of video that has been divided into 50% training data, 25% validation data, and 25% test data. The master video files were spliced at 30 second intervals and sorted to eliminate irrelevant clips (i.e. timeout during game, camera view above water), using the following Python script (from https://github.com/c0decracker/video-splitter):

```
python ffmpeg-split.py -f big_video_file.mp4 -s 30
```

My approach will focus on acquiring swimmers as they enter the camera's field of vision and tracking them until they exit it or become occluded. Potential solutions include a transfer learning CNN (using TensorFlow and ConvNets) or a support vector machine using OpenCV. I would appreciate input on what methods are likely to be effective here. I will need to label my data set and would like direction on the best tools to use for this task.