CS231A Project Proposal: Pool Safety System

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Problem statement:

Having a privet pool in the back yard is fun especially in the sizzling summer days in Texas. However, it is also a source of concern. Every pool owner who has young kids can imagine the tragedy that might happen if a kid falls into the pool by accident. Apart from that, small animals such as bunnies often fall into the pool and end up dead in the skimmers. Some solutions exist in the market for such safety devices for residential usage. However, the professional solutions are complex systems that combine several under water cameras at over $1000 price point. Low end solutions provide monitoring capabilities similar to security cameras in the sense that they can detect some activity in the area but not a specific event.

This project will explore and implement building blocks of a system that can detect a certain object that falls into a pool.

Project phases:

1. Object segmentation – in the first stage, I will use data set of out door pools to train a machine learning algorithm to detect the boundaries of a pool on an image. I will use training data, cross validation and test data to examine my results. I will try to find an existing solution to the segmentation problem.
2. 3D reconstruction – in the second phase I will compute the 3D boundaries of a specific pool. I will use method I learn in the course to resolve the 3D reconstruction problem on one specific pool. I still don't know which technique exactly but I will take the images of the pool by myself so I will have full control on what images I have. I will compare the computed results to actual measurements I will take in the 3D world.
3. Object detection – in the 3rd phase I will detect object in the pool area (boundary box) and compute whether the object is inside or outside the pool. I still don't know what is the best approach to solve this problem.

Either a machine learning solution or a cross correlation between an image and a reference image.

4. Anomaly detection (stretch goal) – Implement an event detection algorithm to detect when a new object is entered the scene and whether this object is in the pool

I plan to complete phases 1 and 2 by the mid report date and phases 3 and 4 (stretch goal) by project end time.