Tracking in Persistent Surveillance

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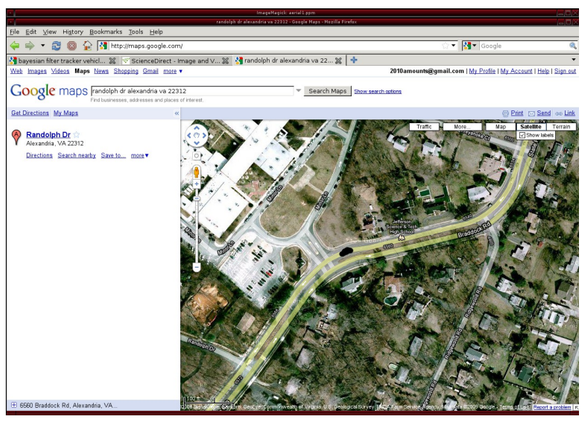
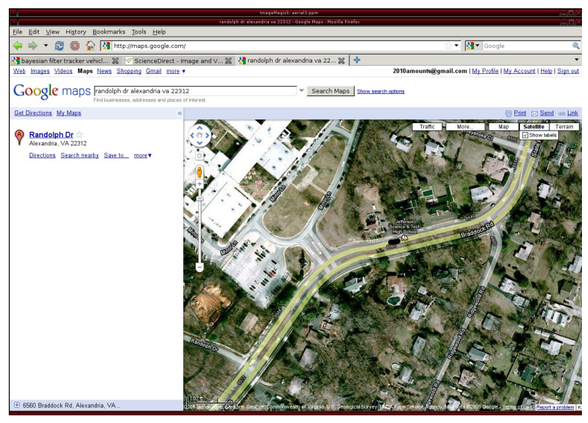
Abstract

The development of a program that can track targets is a crucial development in security and/or surveillance systems. A tracker can be used in the event of a crisis situation to follow potential suspects or targets from the scene of a crime, or to find where these targets originated from, all based on aerial imagery. By using a program to do this, quick, real-time analysis is feasible rather than having humans toil over movies at a later time.

Methods

My project will contain two different methodologies for tracking. The first technique is the use of pixel subtraction, as shown in the image in the top right. It compares a series of images, and highlights the areas of interest, allowing for the target to be tracked. The second method is the use of a Kalman Filter, which is an algorithm used in many image processing applications. It runs recursively and minimizes the error by making slight adjustments. Once the error is minimized, it finishes its estimates. Currently my code for the Kalman Filter has not been adapted for a tracking purpose and instead runs on an example set of data to validate its functionality.





Expected Results

The final result should be able to follow a target or multiple targets through both simulated terrain images as well as real world aerial imagery. I will provide the results most likely in a series of images showing my tracker tracing the path of target(s). I could run the program multiple times, and check if the tracker follows the target throughout its entire path, and graph the percent accuracies depending on the complexity of the image. This project has no apparent end, as the algorithm for tracing and the complexity of the image can always be increased.