Tracking in Persistent Surveillance

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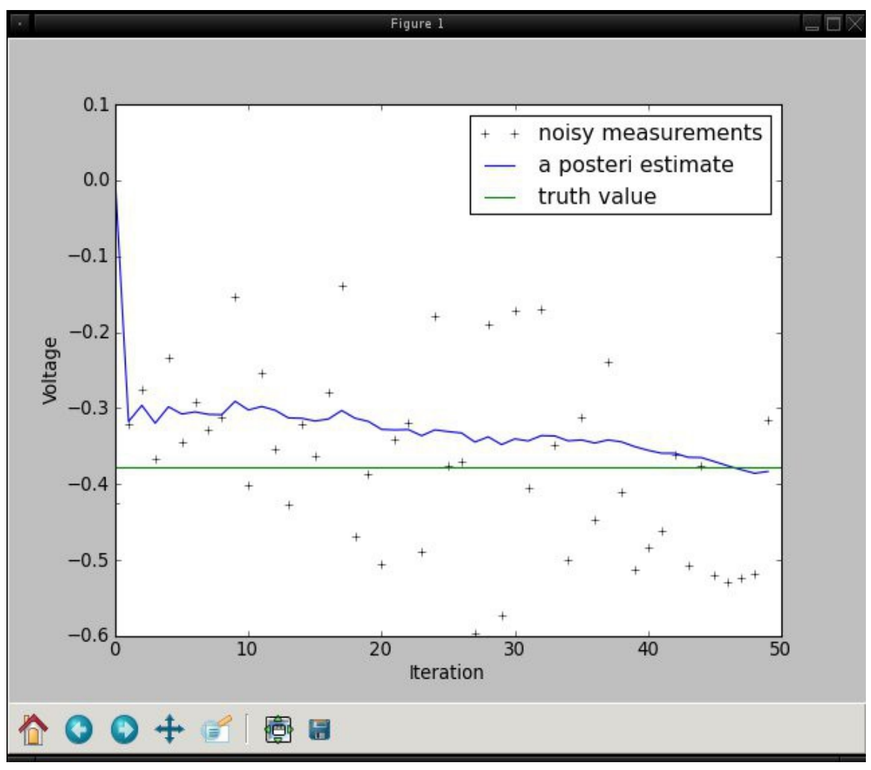
Abstract

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. The Kalman Filter in work is shown in the bottom image at the right, but has to be manipulated for use in a tracking algorithm.



Results

The project has three different result aspects to it. The first section of the project was creating a program to simulate random motion to use for test data for my tracking algorithms. This works just as expected, and provides quick data usable for my other algorithms. My first tracking algorithm uses pixel subtraction and highlights the areas of interest in a series of images. My last algorithm is a functioning Kalman filter, that can approach true values at an exponential rate, however has not been converted into an extended filter for tracking purposes.