Traffic Camera Distracted Driver Detection (TCD^3): Contextually Aware Heuristic Blob Analysis of Traffic Camera Footage to Identify Anomalous Driving

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The goal of TCD^3 project is to identify anomalous driving pattern from traffic camera feeds. Successful execution can improve road safety by assisting law enforcement catch dangerous drivers, who text while driving or drink and drive. TCD^3 overcomes several technical challenges such as detecting vehicles under different lighting conditions, tracking vehicles in different frames, and distinguishing random variations in a vehicle's path due to normal driving from anomalous variations due to distracted driving. TCD^3 Octave script runs on a server, receiving live streaming traffic camera feed. A heuristic image-processing algorithm, that uses morphological operators, performs blob analysis to reliably determine vehicle positions. Image registration allows a vehicle's path to be analyzed through multiple frames. A test suite of 15,000 frames was used to evaluate vehicle detection. Machine learning was used for historical and active comparative analyses of vehicle paths to identify anomaly. The system is contextually aware and is robust with respect to normal irregularities in traffic patterns such as from red lights. Permission for large scale testing of our prototype on actual high fidelity traffic camera footage has been requested. Upon detection, relevant video clip will be extracted and sent to law enforcement for further action. To increase affordability, processing speed, and scalability, a multi-node networked supercomputing architecture, using the Raspberry Pi, is being developed. A method to distribute processing load to multiple threads on the CPU and the GPU is also being investigated.

Awards Won: