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Caltrans Division of Research, Innovation and System Information

Research Notes

Identifying Solutions through Automated Video Incident Detection System (AVID)

Identify an automated incident detection solution using the existing Closed Circuit Television (CCTV) cameras on the freeways

Transportation Safety and Mobility

DECEMBER 2013

Project Title:
Automated Video Incident Detection System (AVID)

Task Number: 2531

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WHAT IS THE NEED?

Presently, the Transportation Management Center (TMC) operators monitor and manage the freeway system for recurrent and non-recurrent congestion and incidents. The operators can verify an incident upon either receiving calls from commuters, monitor CHP log, news media, or viewing the Advanced Transportation Management System (ATMS) map, which presents the freeway speed through the vehicle detection system in a TMC. Once the operators are informed of an incident they utilize the CCTV cameras to verify the incident prior to taking appropriate action in responding and removing the incident. Therefore, there is a time loss between the period that the operators are informed and the incident are verified through the existing CCTV cameras. This time loss will add a few minutes to the verification time of an incident, resulting in additional total delay.

The Department lacks a methodology to verify incidents automatically using the existing CCTV cameras for incident verification, for more rapid incident response and removal.

WHAT ARE WE DOING?

In partnership with Caltrans staff, the research team will define the necessary video analytical requirements to deliver a comprehensive pilot project that will demonstrate the capabilities of a selected Video Detection Application System (VDAS) tool, which automates the video surveillance capabilities of the existing CCTV cameras and enables the TMC operators and managers to verify incidents much quicker.

Then the research team will select 6-10 existing freeway CCTV camera locations in District 12, for the purpose of obtaining recorded videos, and conduct an evaluation of a number of VDAS tools in a laboratory environment

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suitable for detecting the following incident types utilizing a variety of analytical behaviors:

- Disabled or stopped vehicles on the side of the highway
- Presence of a stationary object in the roadway indicating debris or a disabled vehicle in the roadway.
- Real-time traffic congestion levels.
- Vehicle classification investigation

Finally, armed with the laboratory results, the research team will conduct a limited field pilot study with real-time video data as a proof of concept. At this stage, issues related to integration with existing TMC system, and operator notifications protocols will be addressed.

WHAT IS OUR GOAL?

To build intelligence in the TMC central system to allow the existing CCTV cameras proactively detect abrupt changes in traffic conditions on the freeway in real time and alerting the TMC operators visually by depicting the traffic condition on the TMC monitors automatically.

WHAT IS THE BENEFIT?

Verification of incidents on major freeways is one of the most critical functions for incident response. Studies show that every seven minute delay in verification results in one additional mile of queue in the system. Therefore, early verification of an incident results in less congestion and rapid restoration of the traffic.

This research project will identify a solution to build intelligence into the existing CCTV cameras on the freeways to automatically identify an incident and inform the TMC operators and managers accordingly. In this approach the operators can instantly detect and verify incidents in real time without undue delay. The automated CCTV camera system can provide a high rate of detection including the rapid congestion, stationary vehicles, and unattended objects. Benefits include increasing the accuracy and efficiency of human monitoring, insuring instantaneous detection of events that might otherwise go unobserved, and enabling security officials to rapidly respond at the first sign of a security threat.

This will reduce the incident verification and response time, resulting in a considerable reduction in delays and congestion associated with freeway incidents.

WHAT IS THE PROGRESS TO DATE?

This project was approved for funding in May 2013. Currently, the Caltrans project team and University of California, Irvine (UCI) research team is working on finalizing the scope of work and other contract documents. It is planned to submit the final contract package for processing to Caltrans Department of Procurement and Contracts (DPAC) by December 2013 for a project start date of June 2014.

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