Automatic Incident Detection software: how video analytics can improve the traffic management of roads and tunnels.
Case study: Svrcinovec and Polana tunnels

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Abstract
The Automatic Incident Detection (AID) software is a crucial part of an ITS system, above all in a tunnel application. Thanks to the latest algorithms based on the 3D object tracking technologies and the ability to integrate it with other technological systems usually installed in tunnels, it has been possible to increase the safety in the Svrcinovec and Polana tunnels.

Introduction

In the field of ITS, thanks to improved digital and video analysis technologies, many traffic management systems are being turned into intelligent traffic management systems, with substantial growth rates. With global attention focused on traffic management and reducing congestion on the roads, authorities in Europe took significant action in the field of traffic management. In 2004 a specific directive on safety requirements in tunnels (2004/54/EC), was issued, making compulsory to install video surveillance systems with video analysis and automatic incident detection (AID), in addition to ensuring greater integration between technological systems installed in tunnels, such as lighting, emergency call points, ventilation and variable message signs.
Indeed, the real added-value no longer lies exclusively in the performance of each technology but in the ability to integrate these technologies, which ultimately enhances and optimizes the result in terms of information and safety. A complete solution for video monitoring of roads, freeways and tunnels, in fact, requires automatic incident detection and content analysis algorithms, which can be integrated with OCR (optical character recognition) software (for license plate and ADR code recognition) and third-party automation systems. They should also interface perfectly with higher level supervision software like SCADA (supervisory control and data acquisition).

Case study: D3 motorway - Svrcinovec and Polana tunnels.

The D3 motorway is part of the MultimodalTraffic Corridor VI which, after completion, will make quality and fast connection between northern and eastern Europe possible. A new 15-km long section of the D3 Svrčinovec-Skalité motorway was inaugurated in mid-June 2017. The D3 motorway links the D1 motorway, which forms a primary motorway route in Slovakia in the east-west direction. This project will positively affect traffic situation and re-distribution of traffic between the north-south corridors existing in Slovakia. This is one of the key sections of this Highway, which links Poland, Czech Republic and Slovakia.

One of the cores of the D3 Svrčinovec-Skalité motorway solution is the Automatic Incident Detection that detects incidents inside the tunnels Svrcinovec and P'olana. In order to ensure efficient management combined with the latest technology concerning video analytics for traffic applications, a Sprinx Technologies server-side solution was selected and provided by the local partners Gemtech and ADTS.

Sprinx Technologies is an Italian software and engineering company, which develops solutions for video surveillance and video analytics dedicated to the intelligent transportation industry, and it is one of the few market players able to provide total solutions for video monitoring of roads,

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motorways and tunnels. The introduction in all the range of Sprinx's AID software of the peculiar realistic and mathematic 3D object tracking approach, shortlisted at Intertraffic Innovation Award in Amsterdam, allows decreasing the number of false alarms in addition to reducing and simplifying the calibration activity of the traffic algorithms drastically. Moreover, the LPR/ADR software management system developed and provided by Sprinx Technologies enables the integration into a standard intelligent traffic system of additional critical information about the traffic flow, increasing and enhancing the tunnels safety.

The Sprinx SX-TRAFFIC AID software, provided for the Svrcinovec and P'olana tunnels, automatically monitors the traffic and detects events such as stopped vehicles, pedestrians, wrong way drivers, smoke, spilt cargo and traffic congestion. The system is also able to collect statistical traffic data across the entire tunnels infrastructure. Events are integrated into the Siemens SCADA and signaled to the traffic operators at the NDS traffic control center in Horelica, with vital real-time information through video analytics. The control room can then investigate using the video surveillance system and the recordings of the incident. They can take action based on their assessment of the issue: sending a highway patrol, the police, an emergency crew, etc. Moreover, the system includes an LPR system; intelligent cameras, which read both vehicle number plates and ADR codes, are installed at the entrance and at the exit of the tunnels. Considering most of the traffic in this section of highway is due to trucks, knowing the type of vehicles in transit inside the tunnels and the presence of any dangerous goods becomes an extremely important piece of information to allow targeted and timely interventions in the event of a tunnel incident detected by the AID system.

Conclusion

Despite over 6,500 AID video channels being provided in under 10 years, this experience in Slovakia has been extremely stimulating for Sprinx, highlighting the professional quality and skills of the NDS. The NDS's continuous search for advanced intelligent traffic solutions not only to increase the level of security on the highways, but also to enhance the work of the control rooms, is in line with the mission of Sprinx Technologies. As such, Sprinx Technologies was glad and proud to cooperate with NDS.