Umpteen cameras, one storyline

A street mugging or shooting. Good chance of something being caught on film, given the number of surveillance cameras to be found on the streets and in shops and cafés. But how do you 'read' those pictures? How do you reconstruct from such diverse formats and irregular recordings a plausible storyline? TNO has developed a smart resource that can help make a 3D reconstruction.

Dr Miranda van Iersel of TNO sets the scene. 'Say there has been a street shooting. The increasing presence of camera surveillance, especially in major cities, means that you're quite likely to have video images from all kinds of angles. This provides a wealth of relevant information for a police investigation. Certainly if you have the right analysis methods at your disposal.' Van Iersel has been detached to the Netherlands Forensic Institute (NFI) specially for the FES-Camera-3D-project. Together with the NFI and fellow TNO staff she developed smart methods of reviewing, analysing and assembling the surveillance camera images.

'Once the video images of the different cameras have been reviewed by the criminal investigation department, it can be very worthwhile to look at the images in terms of each other,' says Van Iersel, 'because you can then see links between the different events and can more ably construct a storyline.'

To facilitate this, TNO has developed a special tool, the EventViewer. Relevant scenes are graphically marked by coloured blocks that start and end at a particular frame number in the video stream so that they can later be quickly retrieved. This also enables a brief summary to be made of the storyline with the possibility to zoom in on significant events. Van Iersel: 'If you click on a block, all the videos leap to that particular frame number, enabling you to establish links more easily.'

SYNCHRONISED CLOCKS

To be effective, the EventViewer needs all the videos to be synchronised and running at the same speed. This can't be taken for granted since there is no standard for surveillance cameras. Van Iersel explains. 'There are many different systems in use, and often the clocks are not synchronous.' Therefore, the EventViewer uses MediaSync, an application developed by the NFI's own software group. MediaSync ensures that the video streams have the same frame rate – the number of recordings per second – and have synchronised start and end times.

Other things like a witness statement or mobile telephone traffic can be coupled to the graphic representation in the EventViewer. Ultimately, a storyline unfolds about the movements of suspects, victim or witnesses and vehicles, whether they had phoned, whether witness statements can be corroborated, etc.

3D MODEL

A very acceptable reconstruction has been made of a shooting incident in Rotterdam. Van Iersel: 'Since this was not a minor incident a 3D model of the crime scene was also made.' This was done using stereo aerial photos and a relief map. You can position a virtual camera in the 3D program at exactly the spot as the real camera, enabling you, as it were, to look through it. The virtual and real cameras make it possible to make a more complete reconstruction. 'This gives you the opportunity to examine more closely the assumptions being made, about the route of a car, for example.'

The EventViewer is currently being tested by six police departments, including the national police force. 'It is work in progress,' Van Iersel points out. 'We want to find out what is missing and what can be improved. That kind of feedback is vital. So we are looking for more police departments that want to test it.'

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Photo: Flip Franssen / HH

PARTICIPANTS

The FES-Camera-3D-project focuses on the reconstruction of human and vehicle movements involved in incidents like a mugging or a shooting. 2D and 3D models are made using video images from surveillance cameras. The project and its name owe their existence to funding from FES (the fund for economic structural reinforcement). The Netherlands Forensic Institute asked TNO to assist in the proposal and execution. The NFI team is supplemented by three TNO staff and a research assistant from the University of Amsterdam as well as the national police force and regional police departments like Rotterdam-Rijnmond and Amsterdam-Amstelland.