

Intelligent Video Surveillance

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Deployment of smart CCTV requires understanding its social-psychological impact as well as the ethical and legal implications.

Video cameras are increasingly prevalent in society—in both public and private spaces. At the same time, the quality of video surveillance continues to improve. This is especially true of intelligent video surveillance technology, which can recognize or track objects as well as identify human faces and behavior patterns.

Smart closed-circuit television can prefilter large quantities of surveillance data and, if the data contains an unusual or noteworthy event, alarm the operator. Smart CCTV can also provide an unprecedented level of detail that makes it possible to more accurately identify people and objects and to analyze their movements in real time.

Thus far, researchers have given little attention to the ethical or legal requirements of introducing this emerging technology, or to its social-psychological consequences. In 2010, five German universities formed MuViT (a German acronym for pattern recognition and video tracking), a joint interdisciplinary project, to address these issues.

Funded by the German Ministry for Research and Education, MuViT integrates work on smart CCTV in sociology, social psychology, ethics, and law. The project is pursuing two main lines of research. First, it's experimentally investigating the impact of intelligent video surveillance on the public: how do people's perception, reasoning, experience, and behavior change when they're exposed to smart CCTV? Second, MuViT is exploring various legal and ethical issues surrounding the deployment of intelligent video surveillance systems.

SOCIAL-PSYCHOLOGICAL IMPACT

Research shows that paying more attention to individuals can induce changes in their behavior. Exposure to cameras is among many catalysts for increased self-awareness, which people often experience as an unpleasant sensation.

A natural first step for MuViT researchers was to evaluate smart CCTV's impact on people compared to classical video surveillance. We conducted a laboratory study

of three groups of test subjects in which one group was monitored by standard CCTV, one was monitored by intelligent video surveillance, and one wasn't exposed to any cameras. To evaluate the salience of the surveillance, we explicitly informed some subjects that they were being monitored. We also varied the duration of exposure because people have become habituated to cameras in everyday environments.

As expected, the subjects monitored by either type of video surveillance felt more uncomfortable than those not exposed to a camera. Participants under smart CCTV observation experienced more stress than those observed by traditional CCTV technology; they also avoided monitored spaces more frequently and became more conscientious about their behavior—for example, they were more inclined to properly dispose of waste.

Interestingly, the heightened level of stress diminished after about 90 minutes. The fact that test subjects became more comfortable with smart CCTV over time suggests that their initial anxiety could be due to

unfamiliarity with the technology. People have become accustomed to video surveillance, and there's no reason to believe they wouldn't likewise get used to intelligent video surveillance systems. We plan to investigate this hypothesis in a future study.

ETHICAL IMPLICATIONS

Even more than traditional video surveillance, there's a question of where and when it's appropriate to deploy smart CCTV. Unconcealed video cameras tend to "normalize" human behavior: people who are aware that they're being watched are more likely to refrain from going to prohibited places or carrying out undesirable acts.

flagged by the system—for example, disabled persons due to their deviating movement patterns? In what scenarios would smart CCTV be inappropriate, either for practical or moral reasons?

LEGAL ISSUES

Because intelligent video surveillance isn't yet widely used, government officials and legal scholars haven't fully considered its ramifications. It remains unclear whether existing laws regulating the use of traditional CCTV must be amended or entirely new laws must be created to deal with smart CCTV's powerful capabilities.

MuViT researchers are examining the question of whether state use of

venues such as stadiums. While government CCTV systems generally aim to prevent illegal activity, the goal of most private systems is to protect property.

Intelligent video surveillance offers unparalleled capabilities to prevent crimes, identify criminals, and protect valuable assets. However, these capabilities must not come at the cost of interfering with basic human rights. Achieving this balance requires understanding the social-psychological impact as well as ethical and legal implications of smart CCTV. **C**

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The deployment of such a powerful technology demands careful consideration of the location and circumstances in which it will operate. What constitutes normal behavior in a tightly secured airport, for example, differs from that in an open-air public marketplace. However, defining the context isn't always easy, as seemingly abnormal behavior can sometimes turn out to be acceptable. For example, someone who moves in the wrong direction during a security check at the airport might actually be hurrying back to say goodbye to relatives.

Achieving the right balance between the need to encourage lawful behavior with the desire to avoid discrimination, or to cause undue anxiety or inconvenience, requires collaboration between system designers and ethicists. Questions to address include: Is it possible to classify behavior without prejudicing certain groups who might be disproportionately

intelligent video surveillance violates fundamental human rights, which would severely limit its deployment. Because it's a new technology, the researchers are relying on European and US court decisions on traditional video surveillance as well as on other intelligent data-gathering security technologies.

Interestingly, smart CCTV might be considered less intrusive than traditional video surveillance from a legal point of view. German courts have ruled that the human observation of surveillance footage, not the camera itself, constitutes a violation of privacy. Smart CCTV relies less on human perception because algorithms analyze image content, and an observer only reviews a scene if the system detects unusual or noteworthy events.

It's just as important to explore the legal ramifications of deploying intelligent video surveillance in the private domain, including at residences, businesses, and large

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