

<sup>1</sup> In its »desCRY« project, Fraunhofer IPK develops a novel software to identify illegal contents in large multimedia collections.

## SOFTWARE THAT TRACES CHILD PORNOGRAPHY

### Motivation

Digital media worldwide show an enormous growth in visual contents such as photos and videos. The vast amount of new data, spreading like wildfire through various digital channels, is no longer manageable. This would not be a problem, if the pictures would depict just harmless events. Yet in fact, there are more and more objectionable, legally questionable visual contents in global networks.

To detect, evaluate and administer illegal and undesirable multimedia contents confronts investigative authorities with an immense challenge. Until now, criminal investigators have been inspecting those data manually. Commonly employed tools identify known images that have already been classified as questionable or criminal in advance. Hence, there is a fast-growing need for more effective computer-aided solutions for automated inspection of visual contents.

### Technical solution

In its project »Development of an integrated software system to fight child pornography«, in short »desCRY«, Fraunhofer IPK works closely together with investigative authorities to develop a software to automatically analyze the contents of images and videos. The software shall assist in investigating acts of sexual child abuse. Its aim is to identify and analyze child pornography in images and videos on confiscated storage media, to automatically register evidence that may require further criminal investigation, and to document all evidence in such a way that it can be used in court. The desCRY system is based on complex, adaptive pattern recognition technologies, particularly on methods for image processing and analysis as well as scene analysis. It also features novel techniques for the automatic analysis, classification and mod-

#### Fraunhofer Institute for Production Systems and Design Technology IPK

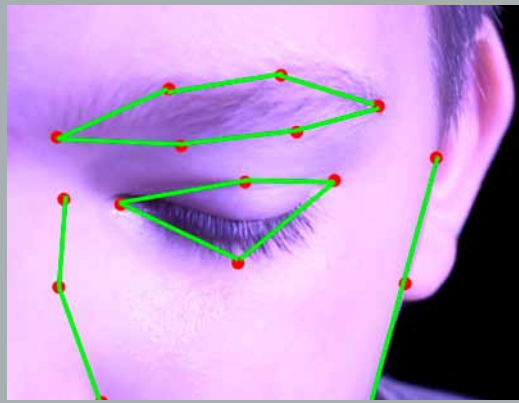
Pascalstrasse 8-9  
D-10587 Berlin

#### Contact

Dr.-Ing. Bertram Nickolay  
Head of Security Technology department  
Phone +49 30 39006-201  
bertram.nickolay@ipk.fraunhofer.de

Raul Vicente-Garcia  
Project manager  
Phone +49 30 39006-200  
raul.vicente@ipk.fraunhofer.de

[www.ipk.fraunhofer.de](http://www.ipk.fraunhofer.de)



eling of visual contents, including skin color segmentation, face recognition and object recognition. They help to reliably find sensitive or illegal contents, even in large image stocks. The software supports typical forensic workflows and provides new opportunities for investigation. Within current projects, investigative authorities verify the efficacy of the methods with real case data under lifelike conditions.

### Advantages

#### Specific software for criminal investigation

The desCRY system was developed precisely for police investigation processes. Tailored tools and intuitive interaction mechanisms assist investigation teams in their daily work and organization.

#### Intuitive use

The system has an intuitive and informative, user-friendly interface. It gives users continuous feedback on how the work is progressing, as well as on how many targets have been found. Advanced visualization components accelerate the inspection of large amounts of visual data. A variety of display options can be set for fitting the needs of specific case data and individual user preferences.

#### Modern database technology

Cooperation and knowledge transfer within forensic investigation teams are facilitated by modern database technologies. Access to current and past cases facilitates

the investigation of complex contexts.

Registration and investigation of persons, objects and places become much more feasible.

#### Highly productive image and video analysis

The system features extendable modules to read and convert a large amount of image and video formats. In addition to conventional computer forensic methods, the new system provides users with various tools for image and video analysis. It thus becomes possible to automatically recommend reasonable content-based data rearrangements for screening. Furthermore, slightly changed image and video copies, as well as parts of scenes can be automatically interlinked and compared to a multimedia reference database. For the investigation of video material the system offers specific methods which facilitate a speedy check of the contents.

#### Scalable and modular solution

The distributed, modular software solution can be easily integrated into customary IT-infrastructures. Its scalable architecture supports single and multi-user applications. Moreover, the content analysis modules can be used separately as server services in network infrastructures.

### Application potentials

Advanced, multimodal visual analysis methods will be indispensable in the future to ensure a reliable and automated recognition of sensitive and illegal contents in digital media. In combination with technologies for efficient multimedia mass storage, further forensic applications can be developed to optimize criminal investigation processes. In the long run, new material can thus be compared with material already registered by forensic science, allowing for cross-references between different cases, visual data and visual content fragments. That way, object recognition can help to find crime scenes, even after a long time. The system also offers application opportunities for small and medium-sized companies in the information and communication technology sector, e.g. in the area of web-filtering and parental control. Such systems to characterize contents can be used as a filter for computers, mobile devices and network infrastructures.

2 *The desCRY investigation tool uses novel image analysis methods like face recognition, skin color segmentation and object recognition.*