Fraunhofer Institut
Produktionsanlagen und
Konstruktionstechnik

Automated image recognition for investigation in art databanks

Art theft has become worldwide problem. Interpol has established a databank for international art investigators, which includes images as well as descriptions of stolen art work. One problem states the fact that this databank is huge and decisions have to be taken quickly and on location, for example during an auction. Furthermore, the existing databanks have often been created by art historians. Hence, a layperson will often have problems to find the proper keyword in order to start the investigation on electronic databanks (material, style, time etc.).

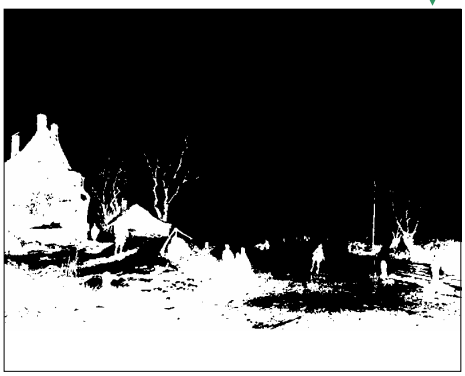
The Department for Security Technology at the Fraunhofer IPK has been dealing with the development of image analysis methods and their practical application for several years. The Institute offers a variety of innovative software solutions, which are especially appropriate for forensic applications. By application of our adaptive image analysis method, locating stolen art works is going to be easier than it has ever been.

Systems description

The tedious investigation of art investigators is going to be immensely simplified and the general handling of art works will turn out to be much safer. In case of suspicion, the investigator takes a digital picture of the supposable loot. The image is coded and sent wireless to a central server. By applying our software, the image can now automatically be compared with the databank images on the central server. Art works like paintings, historic coins or carpets as well as other objects like for example vehicles can be described by our system by acquiring visually ascertainable characteristics like object shape (geometry), colour and texture.

Characteristics like the representative colour and its spatial distribution in the image are used for the comparison of images.

Independence of reproduction scale and range of colours



Comparison of the extracted binary image with the databank

Fraunhofer Institute for Production Systems and Design Technology IPK

Pascalstraße 8-9
D-10587 Berlin
Germany

Department of Security Technology

Contact:
Dr.-Ing. Bertram Nickolay
Email: nickolay@ipk.fraunhofer.de
Phone: +49 (0) 30 / 3 90 06 -201
Fax: +49 (0) 30 / 3 91 75 17

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The image characteristics can automatically be attained, analysed and classified. Nearly in real time the user gets a response about if the art object in question has really been reported stolen. Therefore, by employing the IPK software, investigators are finally able to efficiently utilise existing international art theft databanks.

The technical challenge consisted especially in the fact that the transmitted image mostly shows a differing image of lower quality than the original one as well as an inconsistent reproduction scale and position. This modern image analysis system is largely robust against such sources of irritation. Even differing lightness of colours and lightness distribution, reflections of the flash light as well as minor damages and the angel from which the picture of the object has been taken can vary and the software will still recognize the picture. The comparison of colour balance is device-independent. Therefore, a matching can be carried out despite major deviations from the original.

Performance characteristics

- The image recognition methods can be configured specifically for appointed fields of application.
- Mobile application of capturing devices
- Discontinuation of time-consuming, costly expert's reports
- High accuracy by means of objective classification of identified patterns
- Successful databank investigation despite high deviance from the original image
- Cost-effective as a result of the software running on standard modules
- No necessity for keyword input in order to start the databank search
- Based on SQL / PHP technology
- Databank investigation result in real time
- Compatible with Interpol standards for cataloguing art objects
- Upgrading to 3D applications possible

Applicable for all kinds of art objects like for example paintings, coins, carpets.

Possible Applications

- Police departments
- Customs
- Border Police
- Insurance companies
- Art dealers
- Art collectors
- Auction houses
- Security Departments of companies
- Security Services