

CACTUS-3D

4D Crime Scene Reconstruction and Geo-Referenced Image Retrieval from Mass Image and Video Data

In the field of investigation, the need for automated, retrograde image evaluation is increasingly important due to the rapidly growing amount of image and video data. Intelligent image evaluation processes offer numerous possibilities to support police investigation teams. With CACTUS-3D, we are pursuing the approach of arranging mass image and video data that is georeferenced and synchronized in time on a 3D globe. This provides investigators with a better overview when investigating a crime.

Automatic arrangement of images

By means of 3D reconstruction methods, 3D information can be automatically obtained from mass image and video data. These primarily contain the camera locations of the respective image views. Environment models from a variety of sources can be used to provide visual context to the camera locations. For example, an up-to-date 3D environment model can be generated by means of drone overflights or a video tour with a smartphone and appropriate software in the relevant area. Alternatively, 3D

city models that are already available can also be superimposed.

All data at a global glance

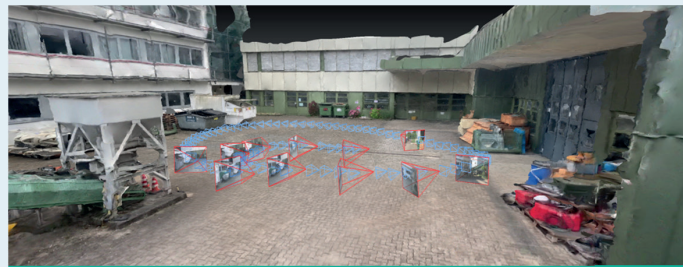
Reconstructed 3D models can be geo-referenced on a globe in CACTUS-3D, in order to provide a global overview of a crime scene. Thus, camera locations and their viewing direction can be visualized on a globe. Image data, which is only added further into the course of the investigation, can also be manually

Fast Facts

1. Tool for interactive 4D crime scene analysis from mass data.
2. Geo-registration of cameras on a globe in 3D.
3. Play crime scene in 4D with embedded dynamic video content.
4. Integrated image search in mass data on a globe.



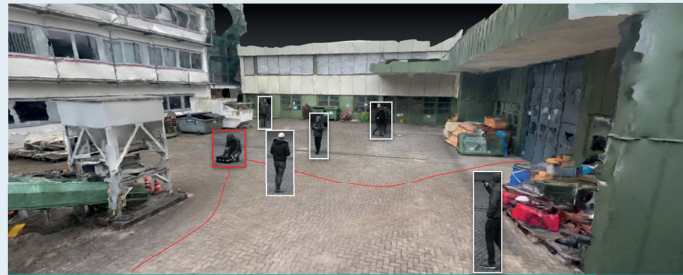
Image and video mass data



3D reconstruction: camera locations and 3D Surface model



Videos from a single or multiple surveillance cameras



Schematic representation of the approach for 3D / 4D crime scene reconstruction from image and video mass data

Schematic representation of the approach for 3D / 4D crime scene reconstruction from image and video mass data.

positioned on the globe by means of simple drag-and-drop interaction. Image metadata, such as GPS tags, are read out automatically.

Free spatial and temporal interaction (4D)

Instead of having to view videos from surveillance cameras individually, CACTUS-3D offers the possibility to view the crime scene in 4D. This is achieved by embedding dynamic video content such as people or vehicles from a single or multiple surveillance cameras directly in the 3D scene. The 4D scene can then be viewed like a video, in which investigators can view from any perspective. If a relevant point in time is determined, it is possible to go back to the original source image or video material at any time.

Fast similarity search on a globe

Mass image and video data can contain a crucial clue relevant to the success of an investigation. Searching through this mass data is like looking for a needle in a haystack and is very time-consuming without further technical means. Users can utilize the integrated image search in CACTUS-3D to search geo-referenced image

databases on the globe for similar images of an image and then highlight the camera locations they find.

CACTUS-3D capabilities at a glance:

- 3D reconstruction for determining camera locations from mass image and video data.
- Georeferencing of reconstructions with thousands of camera locations.
- Easy drag-and-drop of additional image data onto the globe.
- Temporal embedding of dynamic video content, such as people, on the globe.
- Image-based similarity search in a georeferenced image database.
- Text search for places, squares, and streets via OpenStreetMap interface.
- Annotations of images and locations with text and markers.
- All data is locally processed and stored.

Contact us

What other capabilities would support you with your crime scene investigations? Feel free to contact us.

More information at:
www.iosb.fraunhofer.de/cactus-3d

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