ELCOVISION 10 – A Convenient Tool For Offender Size Measurement From Surveillance Images

With ELCOVISION 10 it is very simple to precisely measure the size of an offender using images from surveillance cameras. It is also possible to measure the length of other parts of his/her body if they are visible enough.

After an not enlightened incident the investigating police force shows up at the crime scene and pictures the scene using a high quality calibrated camera:

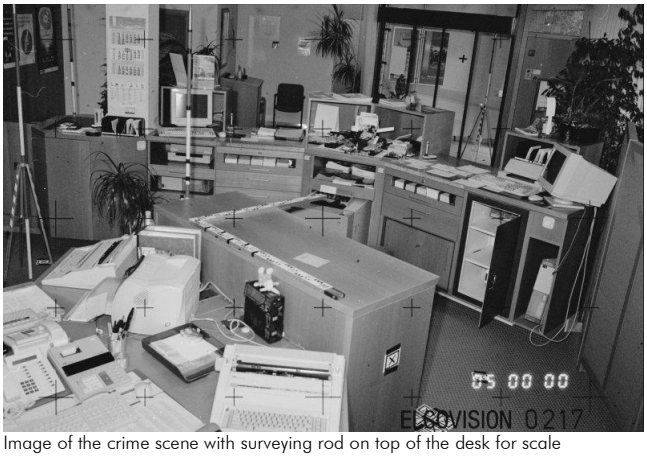


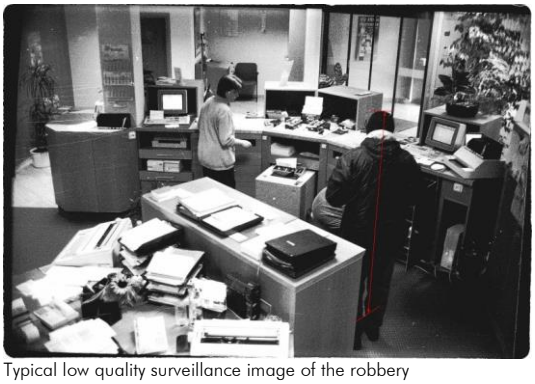
Image of the crime scene with surveying rod on top of the desk for scale information

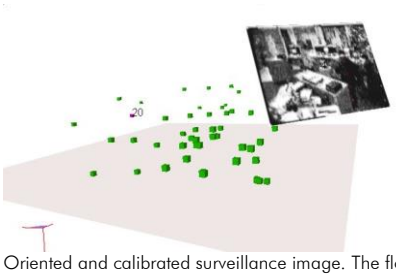


More images of the crime scene

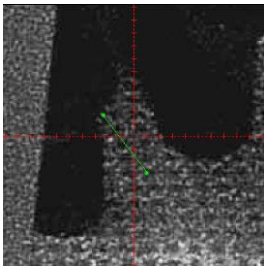
These images are orientated, e.g. the precise point of view of these images is calculated by ELCOVISION 10. This is the base for the calibration of the surveillance image. Normally we compute the focal length and the distortion parameters of the surveillance camera. Especially the distortion parameters are important for the later accuracy of the offender size measurement.

Another important part is that we set up a local system of coordinates in a way that the floor has a height of z = 0. This is done very easily using ELCOVISION 10 "Lokal System of Coordinates" function.

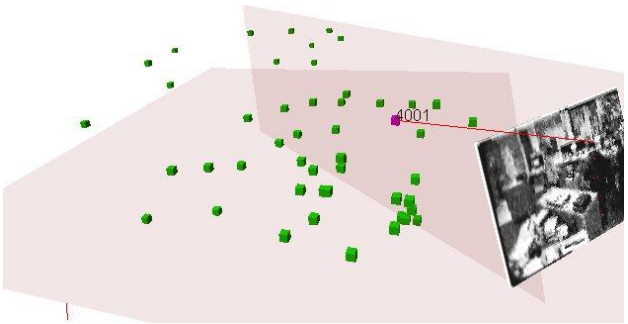

Typical low quality surveillance image of the robbery


Oriented and calibrated surveillance image. The floor plane is faded in gray color

With the ELCOVISION 10 single photo measurement method it is now very easy to define a spatial plane which cuts the offender virtually in half: We chose a picture with an upright standing offender and measure 2 points between his feet defining a perpendicular plane to the floor. These 2 points are faded in green in the left image.



The resulting plane is now used for another single photo measurement directly at the top of the head of the offender. Since we have a local system of coordinates where the floor has z = 0 the z coordinate of the resulting point is directly the offender size with a fairly good accuracy. Tests have shown that the accuracy is about 1.5 – 2 cm, which is very good considering that every human body shrinks typically 2-4cm during the day.



Measurement ray from the top of the offender's head intersecting with the offender body plane giving a 3D point with the z coordinate equals the offender's height.

ELCOVISION 10 Technical Data and Function Overview

Image Recognition and Image Processing

Reads and writes almost all known digital image formats

Full automatic raw-file converter with automatic image optimizing for maximum image quality

Integrated image processing module with color and contrast adjustment, gamma correction etc.

Optimized image display in the magnifier for easy and precise measurement even in underexposed or overexposed image parts.

Réseau Measurement

Full automatic réseau measurement of digital images

Full automatic réseau measurement of réseau images of metric cameras with automatically chosen transformation: affine, helmert, projective or polynomial

Digital Rectification ELSP

Definition of 2D-rectification planes with known rectangles or arbitrary distance squares with 5 known distances

Definition of 2D-rectification planes by perpendicular and parallel lines and at least one known distance

Linking of 2D-rectification planes among themselves and also linking them into the 3D-space using 3D-control points

Definition of balanced 3D-rectification planes using 4 or more 3D-control points

Arbitrary trimming of the rectification planes with automatic determination of the circumference and the area of the resulting rectification plane

Optional lens distortion correction

Automatic rectification as many as desired rectification planes into a digital single picture e.g. an orthophoto

Full automatic generation of 3D-rectification planes from AutoCAD surface models

Full automatic transferring of 3D-rectified textures into AutoCAD

Automatic Image Measurement Modes

Automatic measurement of réseau crosses with sub pixel precision

Automatic measurement of targeted points with sub pixel precision

Automatic measurement of corners and edges

Measuring assistance by epipolar lines

Methods of Orientation

Arbitrary definition of the system of coordinates: Local by distances and/or control points, or with control points within a superior system of coordinates

Full automatic photo orientation

Single and two photo orientation
Multi photo orientation

Bundle adjustment with up to 1000 pictures and simultaneous camera calibration

Orientation of full spherical images

Definition of 3D Planes

Balanced spatial plane by 3 or more 3D-points

Definition of parallel planes by points or with arbitrary distance to other planes

Definition of perpendicular planes to arbitrary other spatial planes

Measuring Methods for Point Measurement and CAD Plugin

Rectification Measurement

Mono Photo Measurement: Intersection of a measuring beam with a 3D-plane

Two Photo Measurement: Balanced spatial intersection of two measuring beams

Multi Photo Measurement: Balanced spatial intersection of two or more measuring beams

Stereoscopic Measurement: Epipolar transformation of non stereoscopic images into a stereo image pair and displaying them with various methods like LCD shutter or anaglyph images.

Measurement from full spherical images

CAD Integration

Seamless integrated into the following CAD Systems, all drawing functions of the CAD become measurement functions

AutoCAD 2009–2016 (32/64 Bit)
BricsCAD V12-V15 (32/64 Bit)

Additional CAD Functions

Superimposition of the CAD drawing into the digital images

Draw perpendiculars with one single measurement

Measuring and drawing of single segmented lines

Simultaneous measuring and drawing of 3D-trimmed lines

Simultaneous measuring and drawing of 3D-balanced lines

Simultaneous measuring and drawing of UCS aligned lines

Circle intersection construction function

Drawing of 3D-circles and circular arcs with three 3D-measurements with plausibility check

Drawing 3D-rectangles with three 3D-measurements with plausibility check

2D-projection of a drawing into any plane

Optimized merging of single lines into 2D-polylines and 3D-polylines

Integrated 3D-surface modeler generating waterproof surfaces from 3D-clouds of points and 3D-line drawings

Built-in generating of contour maps from surface models

Special measuring functions for inserting blocks with automatic block adjustment

Special measuring functions for measuring cylinders and right parallelepipeds

Supported Operating Systems

Windows XP/Vista/7/8/10

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