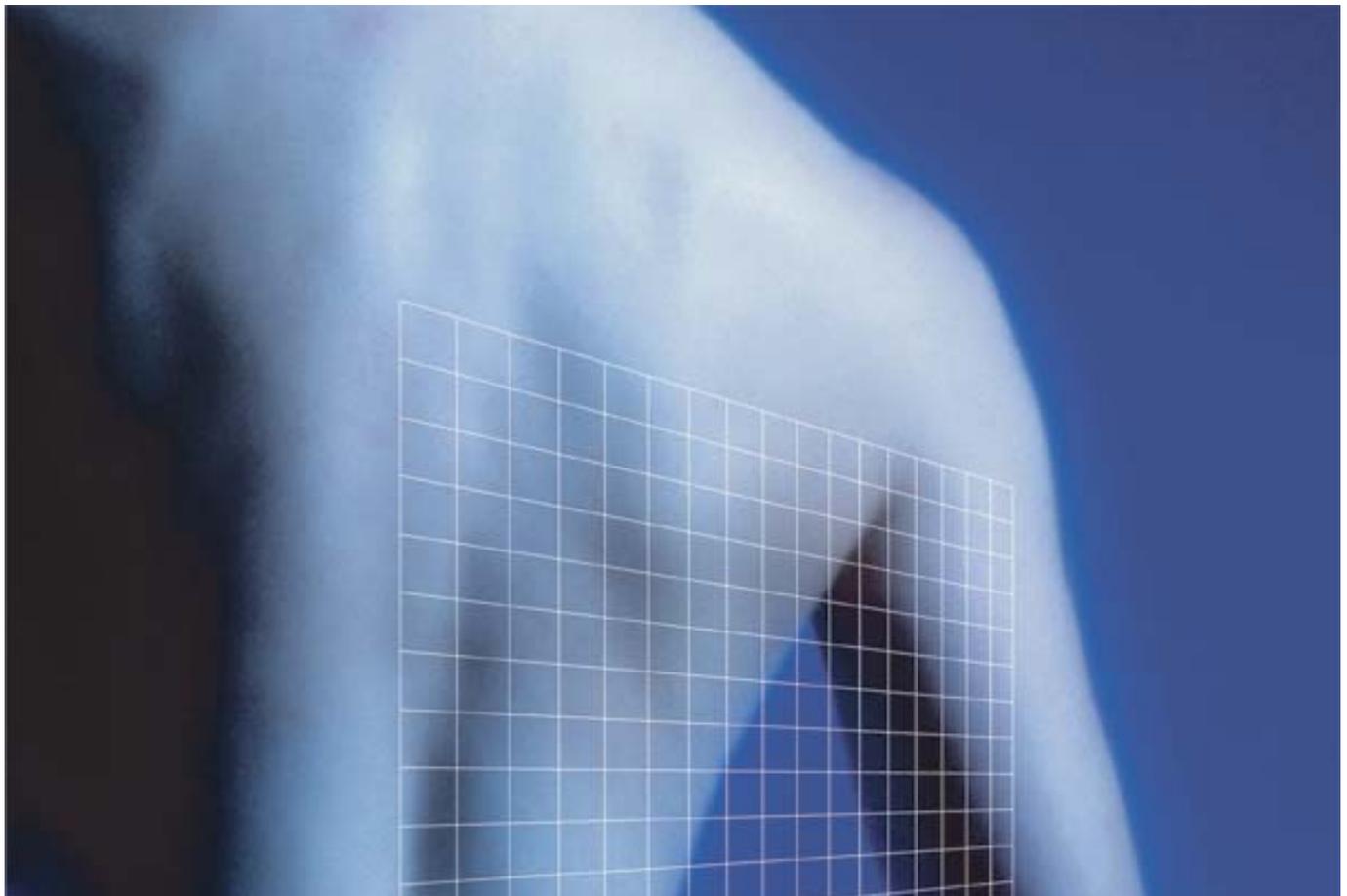# Kuraves

With innovative Kurabo's Kuraves software, you can create 3D image data easily just by taking picture from a distance.

Kuraves software allows you to create 3D image data of any objects just using 2 or more pictures taken by a normal digital camera. The data will be created as 3D data and the measurements, area, volume, sectional drawing and modeling data of the object can be easily output for various purposes.

Features

- ■ A common digital camera is good enough to use with this software and there is no need for a special nor a professional camera.
  Kuraves standard software includes the "Lens Distortion Correction" tool which enables any model of camera to be used with this software.

- ■ Three dimensional data can be created by using any reference scale in the picture (if the scale is not in the picture, then the distance between two objects or distance between camera and an object can be used as a reference scale). No need to worry about the camera location.

- ■ Easy to use software for any non-professionals using your own camera and PC.
  No special tools, knowledge nor skills are required.

- ■ Professional 3D results can be demonstrated visually with using the image data taken by the camera and the "3D Simulation Tool"
  It is a powerful presentation tool to enable the client review the virtual image.

KURABO

1. Correction of Lens Distortion

Each camera has its own lens distortion which has to be corrected. Kuraves standard software includes the tool to correct distortion with its calibration sheet.

### 2. Automatic Point Matching

"Automatic Point Matching", the most innovative function of Kuraves, allows the corresponding points on a line or on the section of multiple images to match automatically by using the "Pattern Matching system". More than 10,000 points can be identified to create the 3D image data. This is the most automated function of this software.

3. Geo-referencing tool

The data can be converted into a Common Coordinate System or points can be fixed to monitor displacement when combining the data from other surveying systems.

4. Area/Distance Calculation

The Triangulation net can be created automatically and the area and distance can be calculated automatically into the output data table.
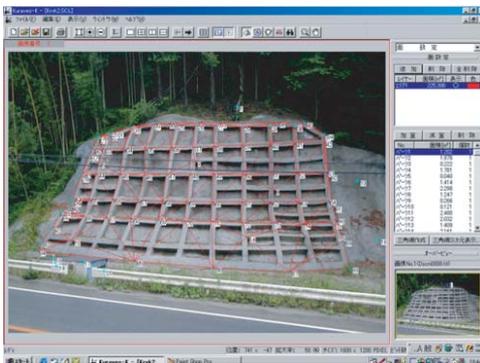

5. Orthographic 3D viewer

An image created by this software can be freely reviewed in 3D by rotating, zoom in/out, or by changing the view angle. Incorrect points input, or mismatching points can be easily detected, Orthographic image can be output to GIS applications. Image data can be output by itself, or displayed with the photographic images and output as a DXF file or other file type.
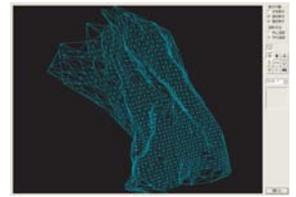
6. Contouring / Cross-section

Tools to create Contour and Cross - sectional drawing are provided with this software.
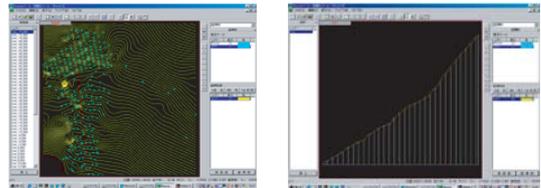
7. Volumetric calculation

The Volume of soil, sand and cavity can be calculated by defining the boundaries. Volume change can be also calculated and compared by entering the data of the current 3D image and previous image data.

8. Joining of Image files

An Image Joining tool is also available to join multiple images by relating data in different files which are created in Kuraves software. This is a useful tool especially for larger aerial surveys, 3D measurements and indoor photographic applications.

Contents of the Kuraves

Kuraves Basic Tool	
Image file import and correction	corrected camera image file, level correction
Automated point matching	optional, manual search, marker search, intersection-straight line-grid
Searching function	auto-matching, auxilary line, next candidate search, perspective search
Clcuration of camera position	rotation setting, error display
Reference settings	two-point distance, camera distance, distance between camera position, measurement co-ordinate, vertical reference
Point attribute settings	layer, color, display on/ off, xyz output(csv)
Distance output	layer, color, display on/ off, print-out
Areal output	layer, color, display on/ off, triangulation net
3D simulation	texture mapping, triangular net, zoom-rotation, center-parallel(ortho)-projection, print-out, output(tiff, jpeg, bmp)
Image refining	high definition 3D, print-out, output(Geotiff, jpeg, bmp)
Image file conecting	connecting plural image files, optimization
Plan view	points-lines printout(scaled), output(dxf, csv)

Viewing & Volumetric Software	
Import file	csv, dxf, SCL*,KVL*,file
Edit	layer, reference elevation setting, rotation, point elevation, 3D edit of contour map
Contouring plot	auto-mapping, step setting, print-out(scaled), output(dxf, csv)
Cross-sectional plot	optional interval, location interval, parallel interval, center line, planned line plot, print-out(scaled), output(dxf, csv)
Voumetric calculation	current, planned, original, cut volume, average section method, mesh method
Export file	each section, volume, total cut volume
Standard accessories	
Camera calibration tool	Camera calibration data print-out, Camera calibration parameter calculation
Distortion correction tool	Trapezoid correction for original picture and output with tiff, jpeg, bmp
Digitization tool for aerial photogragh	Analog photograph digitization function

*SCL,KVL file : Original file

Laboratory Test Result

Testing condition	
Actual scale	4.8m(X)×2.9m(Y)×2.2m(Z)
Testing points	135 marking points
Camera used	Nikon CoolPix700(2M pixel)
Reference Standard	Raika Total Station TCR303
Distance	3m approx(By 3pictures)
Result	
X axis accuracy	2/10,000(0.8mm of 4.8mm)
Y axis accuracy	3/10,000(0.8mm of 2.9mm)
Z axis accuracy	2/10,000(0.5mm of 2.2mm)

Hardware Requirement

Digital camera	more than 5M pixels
CPU	4GHz or more
OS	Windows 7/ Vista/ XP
RAM	more than 4GB
Monitor	more than 1,280 x 1,024
Color	16.7 million or more
CD ROM driver	necessary
License key	USB key protection