fokus
GmbH Leipzig

MEASUREMENTS IN DIGITAL IMAGES.

metigo® 3D

SOFTWARE FOR 3D OBJECT DOCUMENTATION, ORTHOPROJECTION AND UNWRAPPING

3D Documentation

Point Cloud Matching

Surface Models

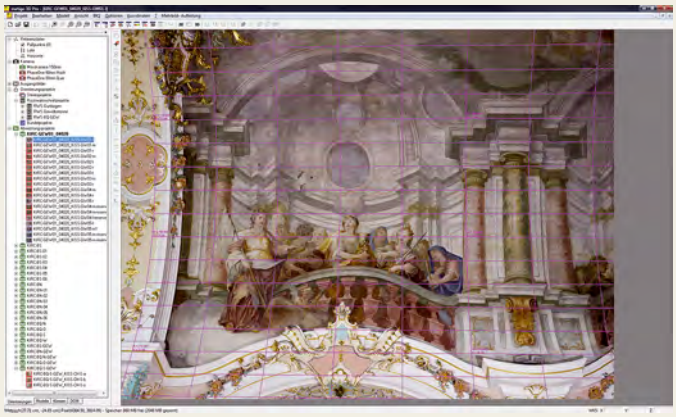
Unwrapping

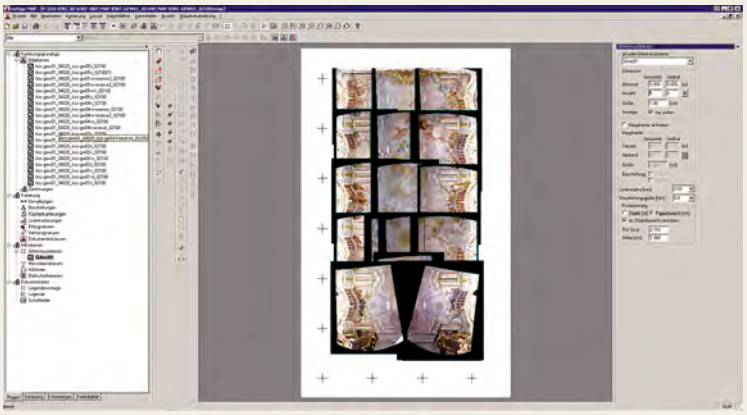
metigo3D

DIGITAL UNWRAPPING

Photogrammetric Orientation

After creating a project in the software evaluation scale and accuracy are defined and images are loaded into it. By linking the images to the according camera with their calibration data, the inner orientation is created for every image.
Object coordinates calculate the photogrammetic orientation of the images with spatial resection.





Kath. Pfarrkirche St. Gallus und Ullrich, Kißlegg
Above: Room view of the nave

Left: Orientated image with the unwrapping cylinder blended in
Right: Image montage in metigoMAP

Digital Unwrapping

Based on the measured ground plans or section profiles parameters for unwrapping are calculated. Spatial planes, cylinders and ground profiles are supported.
On the base of orientated images and parameters for unwrapping the calculation of the partial image plans is done with a user defined scale and resolution.

The result is a true to scale 2D-image plan (TIF-format). For image montage we recommend dimensioning and labeling in the mapping software **metigo*MAP*** with integrated interface for direct delivery as multi layered TIF-file.
The radiometric processing of the images (colour adjustment, brightness and contrast, sharpness) is expediently in a suitable image processing software.

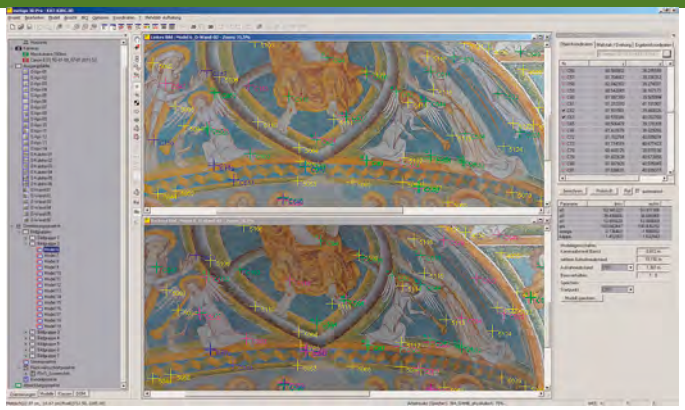
Kath. Pfarrkirche St. Gallus und Ullrich, Kißlegg
Image plan unwrapping cylinder and detail from the unwrapping (left)

3D OBJECT DOCUMENTATION

Photogrammetric Orientation

By automated detection of control points (identical point at the object) the images are analyzed and stereo models are assigned. The relative orientation is calculated with these control points.

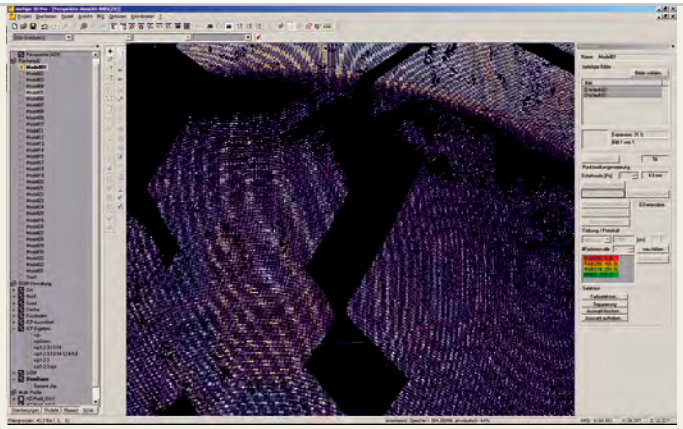
Object coordinates or a distance at the object or between the cameras are used for calculating the absolute orientation.



Castle Katzenstein, Chapel *Relative and absolute model orientation with automated point detection*

Automated Point Cloud Matching

Identical image points are detected with an expansion algorithm and 3D coordinates are calculated.
The 3D object surface is „scanned“ within the image pair.
The point distance at the object and the threshold for point filtering are defined by the user.
The partial point clouds of the used image pairs are merged with the help of an ICP- algorithm. Large projects can be processed efficiently by using batch processing.

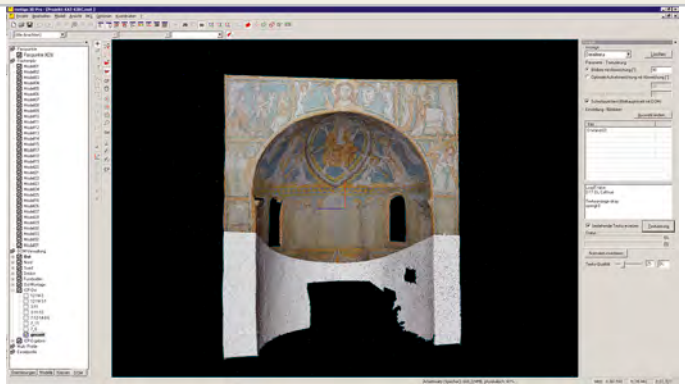


Castle Katzenstein, Chapel
Calculation of 3D coordinates in stereo modell by matching

Generation of Digital Surface Models

Digital surface models are created out of point clouds with a triangulation algorithm. In a second step the image texture of the stereo model are mapped on the surface model making a true to original three dimensional object documentation with photographic quality possible.

The data can be exported to STL- and VRML-file.



Castle Katzenstein, Chapel
3D surface model with image texture

Digital Orthoprojection and Unwrapping

For projection of the images onto a plane or an unwrapping geometry user coordinate systems can be defined or balancing planes can be calculated on the base of selected points.
Sectional profiles can then be extracted and generalized from the existing point clouds or digital surface models.

Based on the orientated images, the sectional profiles and the surface model, the ortho projection is done onto the projection geometry in user defined image scale and resolution.

The result is a true to scale 2D-image plan (TIF).

Castle Katzenstein, Chapel
True to scale unwrapping of the apse with ortho projection, congruent superimposition of colour image (left) and UV-light image

Wayside cross, Halle (Saale)

Left: True to scale ortho image of total view 2012 (created with 6 stereo models) and true to scale ortho image of historic image for visualization of changes made by earlier restaurations (original foto before 1945, from the Bildarchiv of LDA Saxony-Anhalt)

Right: 3D-surface model with image texture

TECHNICAL PREREQUISITES

- digital SLR camera (full frame sensor)
- tacheometer for measurement of reference points and profiles at the object
- PC with multi core processor, at least 4 GB RAM and Microsoft Windows 7 – 64Bit operationg system

WHAT IS metigo*3D*

metigo*3D* is a release from a large program system, that has been developed by fokus GmbH Leipzig and used there for many years.
The service projects of the fokus GmbH Leipzig are piece of evidence to the capabilities of this software.
metigo*3D* offers a high geometric accuracy with photographic quality of the results. For documentation in the heritage **metigo*3D*** is the right software solution for scaled parametric image correction, processing of curved surfaces and ortho projections based on digital surface models.

WHAT CAN metigo *3D*

- Support of all common image formats
- Photogrammetric orientation on the base of reference points, that were taken at the object.
- The integrated format editor offers you the read in of any coordinate formats.
- For recording images we recommend a digital SLR-camera with full frame sensor.
- The photogrammetric orientation of your images can be done by different approaches.
- An automated reference point detection and matching functions for detecting natural point pairs provides you with an efficient and accurate work.
- An integrated matching algorithm supplies you the evaluation of 3D point clouds on the base of stereo models. The partial point clouds are merged together with the help of an ICP algorithm.
- A triangulating algorithm for generation of digital surface models.
- Texturing of point clouds and surface models.

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WHO NEEDS metigo *3D*

metigo*3D* is a convenient tool to support the work of surveyors, architects, building planners, conservators, archaeologists, architectural historians and restorers.
The true to scaled image plans with high photographic quality generated by **metigo*3D*** are the basis for documentation, mapping or the dimensioning and the graphical analysis in the CAD system.

Front page and left:

Excavation project Athribis, Egypt
Fassade of the grave chamber
Above: 3D point cloud
Centre: Digital surface model (DSM)
Below: Textured DSM

Left: Ortho projection

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