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Exercises in photogrammetry using PhoX

Module 6: Absolute Orientation

Objectives:

- Using and processing of an aerial stereo image
- Measurement of control points
- Execution of absolute orientation
- Effect of measurement errors to the result
- Effect of number and distribution of tie points
- Work with orientation parameters and model coordinate system
- Measurement of object coordinates through forward intersection
- Use of epipolar lines

Task 1: Measurement of control points and calculation of absolute orientation

Description:

The image pair of Module 5 (Relative Orientation) shall be oriented absolutely by means of control points. The control points are measured by GPS as UTM coordinates.

Processing steps:

- Load the project from Module 5 (Relative Orientation) (*Project→Load project*)
- Import the file of control points "CPs_OL_GPS.txt" (*Project→Import→Object elements*).
- Measure model coordinates of control points (*Measure→Model coordinates*). Enlarged image patches are given in folder "CP_OL_GPS" for detection and identification of control points.
- Calculate the absolute orientation and analyse the result (*Orientation→Absolute orientation*)
- Save your project archive (*Project→Save project as ... > project archive*).

Test questions:

1. Mathematical model of absolute orientation
2. Achieved transformation precision
3. Orientation parameters of absolute orientation
4. Minimum number of control points for absolute orientation

Task 2: Extended experiments

- Measure exemplary object coordinates (*Measure→Object coordinates*)
- Create exemplary polygons for selected roof areas
- Calculate the parameters of relative orientation from the parameters of exterior orientation of the two images and compare them with the result of Module 5 (*Orientation→Stereo models*:*Orientations*).
- Compare the parameters of exterior orientation resulting from absolute orientation with those from a bundle block adjustment (file: "Exterior-Orient.txt").