



STSM Report

Investigation of possibilities of improved calibration methods used for creating 3D models of cultural heritage objects.

REFERENCE: Short Term Scientific Mission, COST TD1201

Beneficiary: Waldemar Mordwinzew, i3mainz, Institute for Spatial Information and Surveying Technology, Germany

Host: Prof. Dr. Robert Sitnik, Institute of Micromechanics and Photonics, Warsaw University of Technology, Poland

Period: 02/11/2013 to 02/12/2013

Place: Institute of Micromechanics and Photonics, Warsaw University of Technology, Poland

Reference code: ECOST-STSM-TD1201-011113-036661

Contribution to the COSCH Objectives

Although camera calibration improvement is not stated as an explicit COSCH project goal, it provides the foundation for the objectives of the working group 2 (spatial object documentation). In the 1st working group task, cultural heritage (CH) object documentation techniques such as structured light projection and stereoscopic imaging are mentioned. Using these techniques, calibrated sensors are necessary to achieve acceptable geometrical accuracy. Furthermore the camera calibration is mostly the limiting factor for the geometric quality for photogrammetric documentation using the techniques mentioned above. In these cases, the improvements in the camera calibration models would instantly yield better geometric accuracy for the CH documentation.

Learned Methods/Software

Following methods/software have been learned at the host institute:

- Structured Light Projection
- Radiometric Calibration
- DCRAW Library
- Autodesk 3D Studio Max

Knowledge Exchanged

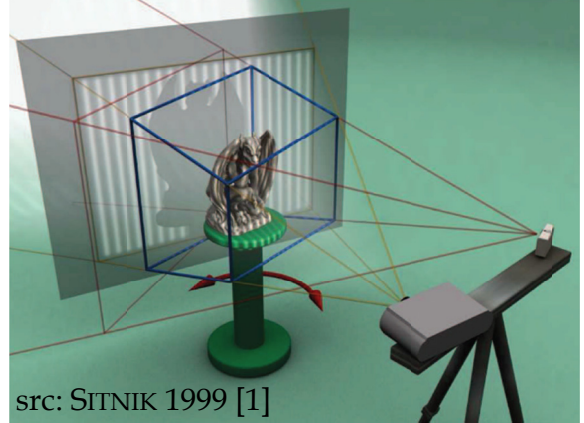
The guest institute researches advanced least squares adjustment techniques, which enable the estimation of camera calibration or form parameters such as bundle adjustment. The knowledge about the least squares method is not only important to perform successful bundle adjustment projects but also to interpret the final results. Recently, the host institute also started to research in this field and offered to collaborate on this topic. In this context two methods were taught to exchange knowledge: Least Squares and Bundle Adjustment.



Radiometric Calibration

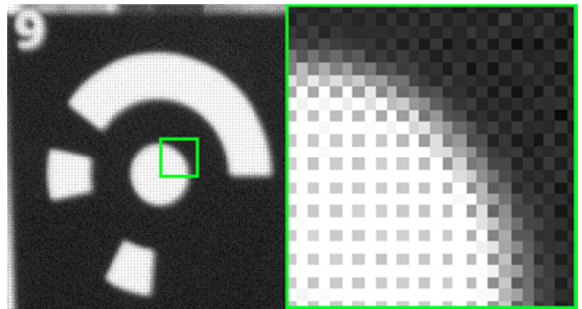
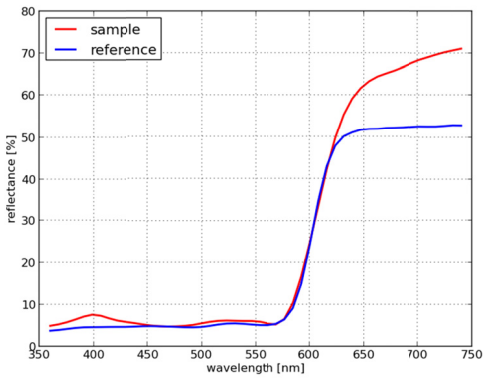


Structured Light Projection

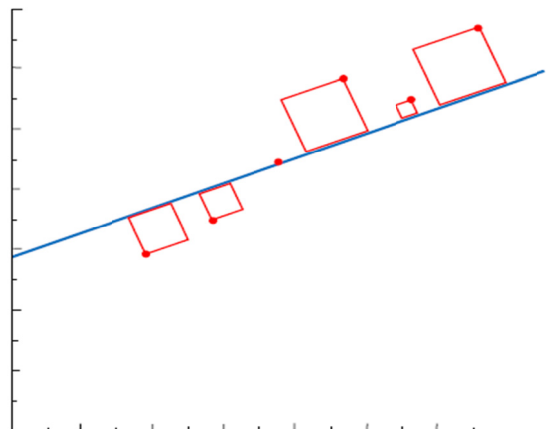


src: SITNIK 1999 [1]

DCRAW Image Library



Least Squares



[1] SITNIK, Robert: Odzworowanie kształtu obiektów trójwymiarowych z wykorzystaniem oświetlenia strukturalnego. (1999)