LASERSCANNING AND PHOTOGRAMMETRY FOR THE MODELLING OF THE STATUE MARC ANTON

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KEY WORDS: Laser scanning, Close Range Photogrammetry, Heritage Conservation Research, Adjustment, 3D Modelling, Triangulation, CAD, NURBS

ABSTRACT:

Photogrammetry is a well-established method for the use of heritage recording and documentation, whereas terrestrial laserscanning is a rather new technique for 3D object modelling. Both sensor systems have their advantages. Laserscanning provides a very high point density on the object surface, allowing a very detailed surface description, within a more or less automatic recording procedure, while photogrammetry offers - additionally to the possibility of accurate 3D point or line/curve measurements - texture information, being very important for the purpose of interpretation and documentation.

This paper deals with the combined use of both techniques in order to use the individual advantages. The statue Marc Anton (located in the city center of Vienna) has an approximate size of 2.5m by 5m and has a height of 3m. The statue represents Marc Anton sitting on a chariot pulled by three lions. The aim is to determine a 3D model of the whole sculpture for documentation purposes (e.g.: showing differences in the used material, decomposition and offering the possibility of adding further information to certain parts of the statue).

First, we describe our experiences during data capture and focus on a description of the acquired data sets. The following work can be split into two parts. The first part deals with the registration of the different sensor positions into one statue co-ordinate system, whereas the second part concentrates on the 3D surface modelling. For the adjustment manually measured tie points were used. These points were measured in the image data as well as in the intensity images of the laser scanner. To improve the measurement accuracy in areas with low texture, retro reflective targets, which can be accurately measured in both data sets, were used. All these measurements are the input for a hybrid chained spatial simultary transformation. Error detection was performed and an analysis of the accuracies of the individual observation types using variance component analysis will be presented. The surface modelling is performed with the software package Geomagic Studio. After a 3D-triangulation the surface is simplified using NURBS (Non-Uniform Rational B-Splines) in order to generate a CAD model. In this section the practical problems and the time required for the different steps will be discussed. A comparison of the CAD model to the triangulated surface will be given. A final section will sum up our experiences with the combined use of both data capture methods and gives an outlook into further research goals.

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