Web Based 3D data extraction using the concept of panoramic Images and TLS

Julia Ganitševa, Martin Unold, Kai-Christian Bruhn, Fredie Kern, Florian Thiery

Abstract

IBR (Inschriften in Bezugssystem des Raumes) is a joint research project by the i3mainz – Institute for Spatial Information and Surveying Technology and the Academy of Sciences and Literature Mainz funded by the Federal Ministry of Education and Research. The goal of the project is to develop a set of tools that enable humanities to study objects in their spatial context. The use case of the project consists of inscriptions and their context within mediaeval Christian architecture, based on the example of Liebfrauenkirche in Oberwesel, Germany. Using the advantages of Terrestrial Laser Scanning and Panoramic Photography incorporated with the expert knowledge of the epigraphical data, our research aims are to create a generic web based application which will allow users to store, process, reconstruct and visualize the spatial relationship between object geometry, location and historical meaning. Moreover the generic approach of the system architecture should be suitable for a variety of applications in the cultural heritage domain even beyond the epigraphical and architectural areas.

Dense Laser Scanned datasets and its various types of visualisations provide 3D spatial information in a great level of detail. However, within the scope of our project, strong demands on web-based availability of detailed 3D information and an easily accessible interface to the data apply.

Exchange of images through the internet is fairly easy. Panorama based virtual tours are widely available all over the web and much like 3D spatial environments they allow users to explore a variety of existing locations on-line. However, the information incorporated in panoramic views is barely referenced to geographical features and does not provide any connection to real world coordinates.

How to enrich user-friendly virtual panoramic environments with high accuracy 3D spatial information of LiDAR point clouds?

The goal of the presentation is to introduce the approach of 3D information extraction by means of matching 360° panoramic photography with the intensity images derived from the TLS data. Furthermore, tracing back the 3D spatial coordinates of every pixel using the image connection to the point cloud. Finally it will provide a brief outlook on concept implementation within in the frames of IBR project architecture and beyond.