EXPLORATION AND VISUALISATION OF INFORMATION IN THE HISTORIC 3D CITY MODEL OF SOLOTHURN

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ABSTRACT:

In this paper we present work in progress. Starting in summer 2008 we digitally reconstructed the city of Solothurn around 1820 based on the historic city model displayed at the Museum Blumenstein in Solothurn. This project marks one of the most recent activities within the long-term initiative '3D Cultural Heritage' at the Institute of Geomatics Engineering (IVGI). The initiative is linked with ongoing research efforts in 3D GIS, virtual globes, 'automation in 3D reconstruction' and 3D geovisualisation. The work presented here is a joint effort by IVGI researchers, geomatics students, the Museum Blumenstein and the 'Amt für Denkmalpflege' in Solothurn.

The historic city model was built in 1920 on behalf of the former 'Verkehrs- und Verschönerungsverein' of the city of Solothurn and it represents the city around 1820. The cardboard model has a scale of approx. 1:500 and it measures 2.0m x 2.5m. Additionally, there is an abundance of historic data about the individual buildings of the city and their inhabitants from 1820 and through history.

The technologies employed and the challenges faced in digitizing and reconstructing the historic city model of Solothurn are reported elsewhere (Nebiker and Barmettler 2008). The result is a detailed textured digital 3D city model of Solothurn around 1820 (see figure below). Each of the approximately 900 buildings is a separate object in an Oracle database and can now be enriched with the available historical and sociological information of different time periods. This shall enable scientists from different disciplines to perform spatial and semantic queries and to visualise the result in 3D either within the 3D GIS or, for example, in an external virtual globe environment.

Together with historicans of the Museum Blumenstein we are discussing the scope of analysis and visualisations that are sensible and technically feasible. The historical 3D GIS shall not only allow the researchers to explore their rich data sets but also serve as an instrument for better communication of historic knowledge to museum visitors. This bears the challenge to structure the vast amount of historic data in a way that not only researchers intimate with the data can profit. We look at different types of structures, like tree or network structures, and the use of intuitive queries and navigation such as employed in strategic computer games. Additionally, the system needs to be easy updatable as new facts and ideas are discovered from time to time.

Technically we are exploring a number of possibilities such as data storage, exploration and visualisations in DILAS (Digital Landscape Server, Nebiker 2002), LandXplorer (http://www.3dgeo.de) or the integration of 2D and 3D using i3D (http://www.fhnw.ch/habg/ivgi/forschung/i3d) or Google maps and Google earth APIs (http://code.google.com/apis/maps/ and http://code.google.com/apis/earth/). To allow exploration, access and queries directly to the database must be permitted. The workflow from extracting interesting objects and information to the visualisation of them shall be automatic and fast. Many of today's 3D visualisation workflows assume that the visualisations can be prepared in advance. Additionally, the use of a detailed digital historic 3D city model with its narrow streets for the visualisation of thematic data poses a number of challenges such as occlusion, combination of texture, colour and/or transparency. Other interesting aspects include the handling of uncertain historic knowledge or information which is not exactly assigned to a specific time period in history or which changes over time. Additionally, researchers and museum visitors also want to compare the historic city layout and information with today's Solothurn.