Topic Field

Cartographic Abstraction and Obfuscation Techniques for Privacy Enabled 3D City Models

Due to recent technological progress, data capturing and processing of highly detailed (3D) data has become extensive. And despite all prospects of potential uses, data that includes personal living spaces and public buildings can also be considered as a serious intrusion into people's privacy and a threat to security. It becomes especially critical if data is visible by the general public. Thus, a compromise is needed between open access to data and privacy requirements, which can be very different for each application. As privacy is a complex and versatile topic, the focus lies here particularly on the visualization of 3D urban data sets.

For the purpose of privacy-enabled visualizations of 3D city models, the urban space can be subdivided into privacy regions, each featuring its own level of anonymity. Therefore, a central issue is the automated generation of conflict-free spatial partitionings of 2D base maps and 3D object data with regard to privacy enabled (real-time) visualizations of 3D city models (see Figure 1).

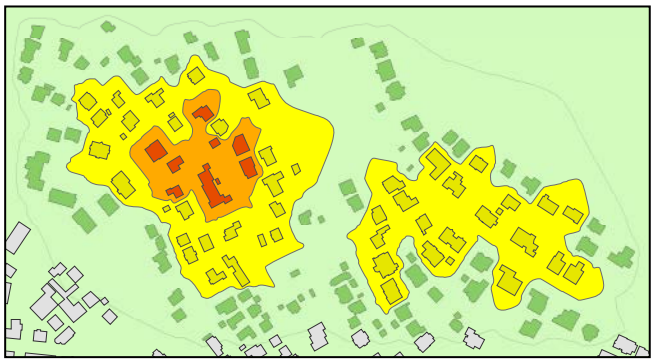

Figure 1. Base map with different privacy zones.

Within each region, the depicted 2D and 3D geometry and imagery can then be anonymized with cartographic generalization techniques. Presenting maps with different base maps, for example, in the form of aerial photos and cartographic maps, the change of appearance between zones is aggravated leading to a rather unaesthetic impression of the scene as a whole.

Thus, a continuous transition between the generated 2D zones is required to make the base map and entire 3D city model appear visually more pleasing and harmonious (see Figure 2).

Figure 2. Privacy map with blended representations of corresponding map and aerial image.

After the establishing of additional transition zones, image based blending techniques can be used to realize a smooth change of representation within a 3D scene (cp. Figure 3).

Figure 3. Residential urban scene featuring two different levels of detail for different privacy zones.

Exemplary topics for master thesis:

- ☐ For more details about exemplary topics, please refer to the display case of the chair "Methods of Geoinformation Science" at room H5121 (main building of Technische Universität Berlin).

Recommended skills:

- ☐ Geometric computations, programming (C++), image processing, 3D modelling.

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