Topic Field

Quality Assessment of Multi-Representations of Building Footprints

Along with the constantly improving acquisition, processing, and visualization techniques, the amount of spatial data that is available today has dramatically increased. As a consequence, various data sets for one and the same area are often available, reflecting temporal changes or representations at different levels of detail. Thus, there is a rising need to compare such data sets in order to assess their quality and pick out the proper one for a specific application.

In urban areas, buildings make up an essential portion of GIS data. And even though 3D models are already captured for many cities, the predominant building type for comprehensive data sets is still 2D footprints. For various reasons, multiple versions of one and the same building might be available that differ both in geometry and shape. The reasons are various like data collections at different times, transformations by means of analyses (e.g. 3D building reconstruction) or for visualization and cartographic generalization purposes (see Figure 1).

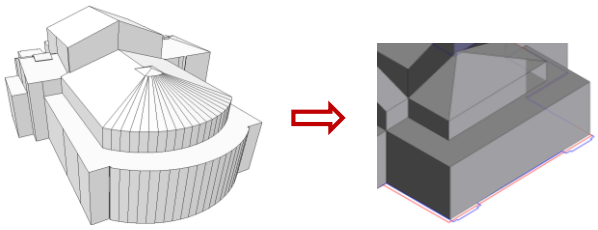
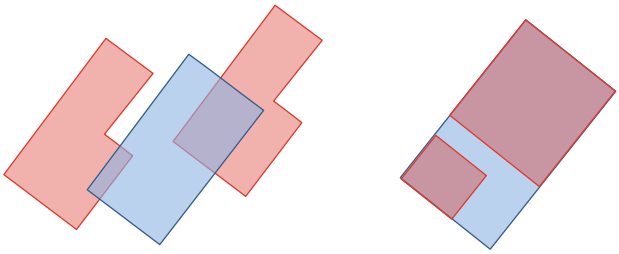


Figure 1. 3D building and its cartographic generalization.

While small geometric differences are naturally inevitable and insignificant for most applications, it is, however, important to be able to automatically identify large changes in location, extent and particularly in the shape of the objects. A possible spatial displacement of an object and the lack of information about the correspondences of its parts (as in the case of cartographic typification; see Figure 2 a)) makes this task more challenging.

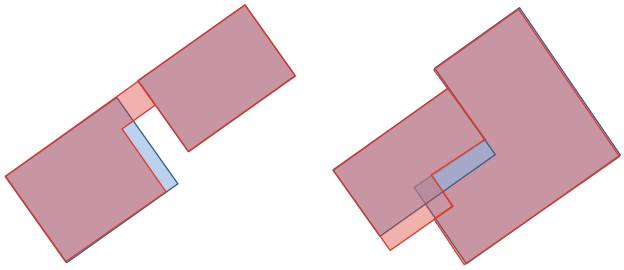
Furthermore, there is not always the possibility to compare geometrical characteristics of two different representations of an object one-to-one, as several footprints can be, e.g., aggregated (cp. Figure 2 b) which also needs a profound consideration.



a) b)

Figure 2. Building footprint displacement a), aggregation of two building footprints b).

Another interesting aspect of the quality control is the handling of adjacent footprints. Here, the preservation of common façade lines (see Figure 3a)) can be crucial for sustaining of spatial and semantical properties of the appearance of the area.



a) b)

Figure 3. Gaps between adjacent buildings a), overlapping buildings b).

The avoidance of spatial conflicts, such as overlapping footprints (cp. Figure 3b)), is of particular concern for adjacent footprints which have been simplified.

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:

- ☐ 3D modelling, geometric computations, programming (C++)

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