CITYFIT - High-Quality Urban Reconstructions*

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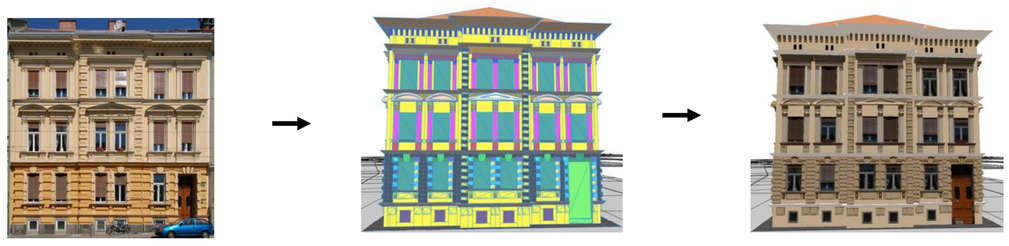
The Goal

Building high-quality 3D city models from streetside images is the goal of this project.

The city models are generated from semantic information **fully automatically**. Currently extruded ground polygons models should be enhanced with **realistic semantic façade information**.



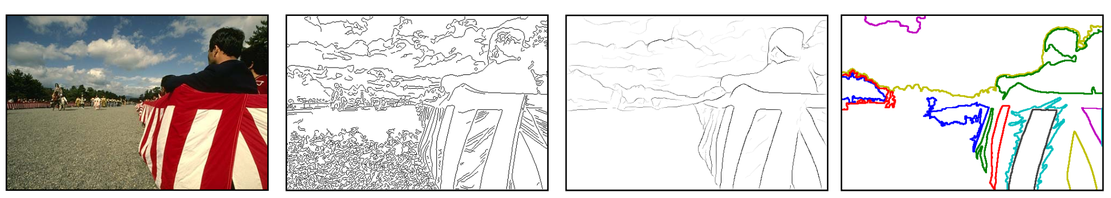
The Challenge of Graz

Range of façade styles from medieval to post-modern with a high density of decorations.

Semantic Information Extraction through Detection

Image Analysis

- Extract stable edges from images [1]
- Reduce clutter of typical Canny results



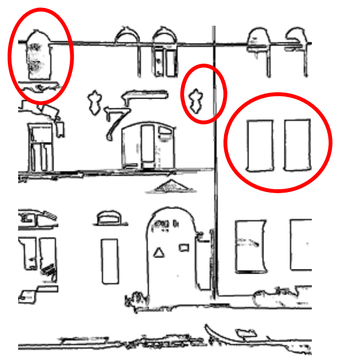
Input Canny Berkeley Stable Edges

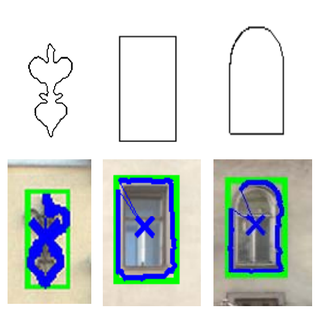
Semantics through Structure

- Semantic information for modeling from detection
- Façade structural elements:
  window, door, balcony, decoration, etc.

Detection of structural elements

- Shape as discriminant feature for façade elements
- Prototype partial shape matching on edges





- Star model accumulation of fragment votes
- Affinity-propagation clustering of detection votes

Vote accumulation

Detection results

The Generative Modeling of Façades

Interface with each semantic element's type, size and location is used to automatically generate façade models in an hierarchical representation. Semantic elements modeled as convex polyhedra to compact data for web transmission.

Streetside images provided by Vexcel Imaging GmbH (Microsoft Photogrammetry), Graz, Austria.
City models and renderings by Bernhard Hohmann and Ulrich Krispel, Institute of Computer Graphics and Knowledge Visualization, Graz University of Technology, Austria.
[1] H. Riemenschneider, M. Donoser and H. Bischof, *Finding Stable Extremal Region Boundaries*, Austrian Association for Pattern Recognition Workshop (AAPR), 2009

www.icg.tugraz.at/research/CityFit and www.cgv.tugraz.at/cityfit

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