3D MODEL ENHANCEMENT USING GIS DATA

1. INTRODUCTION

Building 3D models of urban areas is one of the hot topics right now at both the industrial and the scientific level. The range of applications of these 3D models run from a simple google-map approach for visualization, to forensic investigation where 3D models are used for analysis of the crime scene. The approach to building such 3D models can be categorized in 3 areas: classical approach, high tech approach and scientific (or elegant) approach.

The classical approach covers techniques based on laser scanners, active stereo vision (where markers are used or a pattern is projected into the scene). The high-tech approach is what the industry is using. Companies such as Google or Cyclomedia spend thousands of dollars in fancy equipment to obtain a set of geolocalized images. Later, a set of highly skilled modelers manually build the 3D model. The elegant approach is however more scientific. The goal is to use state of the art mathematical methods to build a 3D model from a simple set of images. In this scenario no expensive equipment is required (dGPS, laser, scanners, IMU, etc). With something as simple as a pocket camera a 3D model can be built. These models however lack some information regarding the ground for instance and typically consist of planes or surfaces.

The goal of this MSc project is to integrate existing sparse 3D models obtained with state of the art computer vision methods with additional information in order to complete the 3D models and offer a more appealing and realistic look. In particular the student will have to integrate GIS (Geographic Information System) data with 3D data.

Steps needed for this task are:

- Develop the method and techniques to geolocalize the GIS data and the existing 3D model.
- Detect the ground level and roof level in the sparse 3D models.
- Use the integrated models to project aerial images into the ground.
- Use GIS data to match the sparse 3D models with buildings and fit more complex primitives (such as blocks) and project the texture.

The ultimate goal is to integrate GIS data with the existing sparse 3D models to obtain a more appealing and visually attractive 3D model. The complete process should be automatic and computationally feasible.

If you are comfortable working with Matlab, have a strong interest in 3D modeling and want to get your hands in one of the hot topics in computer vision, please contact us and we will consider your application.

For more details: isaac.esteban@tno.nl Example of 3D models can be found here:

- http://www.youtube.com/watch?v=lVZWyNOBflg
- http://www.youtube.com/watch?v=6b1FS8zbw4I

Date: Jan 2010.