INTERACTIVE EDITING OF URBAN SCENES

3D reconstruction of urban scenes has a variety of applications such as: mapping and navigation, urban planning, evacuation planning in emergency situations etc. Among the many methods proposed to enable accurate reconstruction of urban scenes, image-based methods have gained significant attention owing to the easy and rather-cheap acquisition process. However, many challenges arising from different lighting conditions, insufficient textures, occlusions are unsolved. On the other hand, an important observation about building and building facades is that repetitions are very common. In our project, our goal was to explore these repetitions to increase the robustness and the accuracy of the 3D reconstructed models and provide an interactive image editing setup using the extracted information.

In this project, we have been working on a system which takes as input a set of images of a building façade and computes the transformations relating the images to each other and the 3D scene. This information is later used to perform image editing operations. The main challenge is to be able to compute reliable transformations between the input images. The presence of repetitions create an ambiguity while computing correspondence points across the images. We aimed to overcome this challenge by first trying to identify these repetitions and then resolving the ambiguities globally with this pre-computed knowledge. Once we compute robust transformation between the images, we let the users to interactively edit the detected repeating patterns.

Our results in the scope of this project have been accepted as a publication for one of the top-ranked journal in computer graphics, Transaction on Computer Graphics. Below are some results we have. The first image shows an example input image and our system has detected 2D-grid of windows in the scene. The user can change the number of rows and columns in this grid and the images get edited accordingly.

example input image

editing results