

ENHANCING URBAN DIGITAL ELEVATION MODELS USING AUTOMATED COMPUTER VISION TECHNIQUES

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ABSTRACT:

In recent years digital elevation models (DEM) gained much interest because of their high capability to give information about urban regions. DEM can be used for detailed change or damage detection purposes. However, initially DEM with very sharp details should be constructed. DEM is generally derived from very high resolution stereo satellite images. Unfortunately after this process, regions which are occluded in one of the stereo images have no value in DEM. This is major problem especially in urban DEM, since buildings occlude many regions. However unfilled regions can be filled using interpolation techniques, they lead to loose sharpness in building edges which have an unfilled region nearby. To overcome this drawback, as many researchers claimed, filling unfilled regions using data that do not contain any strong features (such as building edges) may provide better recovery. Therefore, if building rooftop and background can be distinguished from each other, unfilled regions can be interpolated better using only background pixels. To do so, in this paper we propose a special automated DEM enhancement technique. First, we detect possible building locations from the local maximums of DEM. Then using detected building locations and panchromatic image of region we detect building shapes with a shape approximation approach. After subtracting detected building regions from DEM, we obtain only background pixels and use them to fill unfilled regions. As a result, we obtain filled DEM with sharper building edges. We believe that proposed enhancement in urban DEM will lead to more detailed change and damage investigation.

TOPIC: Land cover classification

ALTERNATIVE TOPIC: Image processing and pattern recognition