Automated Building Extraction from Aerial Images with An Improved End-To-End Deep-Learning-Based Approach

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SUMMARY

Automatically extracting high quality building polygons from satellite images is crucial for supporting land use and land cover mapping as the traditional object extraction process requires human image interpreters which is labor intensive and time consuming. This paper adopts the state-of-the-art Swin Transformer neural network as the backbone of Mask R-CNN to precisely segment building instances. Since the polygons directly converted from instance segmentations often differ from real-world building footprints which usually have straight edges and right angles, they are undesired for many cartographic and engineering applications. Hence, a building regularization method is presented to produce regularized and precise building polygons. The building regularization consists of generating polygon hypotheses with a novel hypothesis generation

method, and optimizing the hypothesized models using a modified Minimum-Description-Length□based method which emphasizes on obtaining low residuals between the predicted and hypothesized polygons with a slight sacrifice to the model simplicity while forming regular shapes. Evaluations of the proposed method on the round 2 dataset of the SpaceNet Building Detection

Challenge show that our method surpasses several other state-of-the-art methods in terms of the extraction accuracy and completeness. This work is beneficial for various land use and land cover applications such as urban expansion, city planning, resource management, etc. Our future work is to precisely extract buildings with complex features such as curved edges and non-right-angled

corners.