

ODM2OSM: A tool to extract building information from open drone data to enrich OpenStreetMap

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Abstract:

Drones are becoming increasingly popular in the surveying and mapping industry, supplementing the traditional remote sensing techniques while providing several key benefits, such as very high spatial resolution, high accuracy, provision of 3D spatial data, remote operations, low cost, and the control over the observation data. Both public and private mapping agencies are using drones for various applications that include urban planning, agriculture, environmental surveying, and disaster management. A vast amount of collected drone data holds a tremendous potential for updating existing geographic databases. However, there is not yet a framework for automatically extracting information from drone-based map products to enrich geographic databases. In fact, volunteered geographic information (VGI) or crowdsourced open geodata has received a growing public attention. OpenStreetMap (OSM) is undoubtedly the most mature and best-recognized project that provides worldwide open geographical data and has been widely recognized as a powerful complement to imagery understanding. Conversely, OSM can also be enriched by imagery data, thereby incentivizing more participants, especially citizen scientists, to contribute more valuable data items. The importance of this latter aspect is so far largely ignored.

This study aims to develop a framework with necessary tools to extract building information from drone data for the enrichment of OSM buildings. The backbone of the framework is OpenDroneMap (ODM) - an open-source photogrammetric toolkit that serves to process drone imagery into maps. On top of ODM, additional functions based on deep learning will be developed to extract building information such as precise footprint, roof shape and type from UAV orthomosaic following the OSM attribute convention. The extracted building footprint can be then used to derive the building height from the digital surface model. The resulting 3D models will allow the creation of simplified 3D meshes for selected buildings, thus boost the extension of 2D OSM to more valuable 3D OSM.

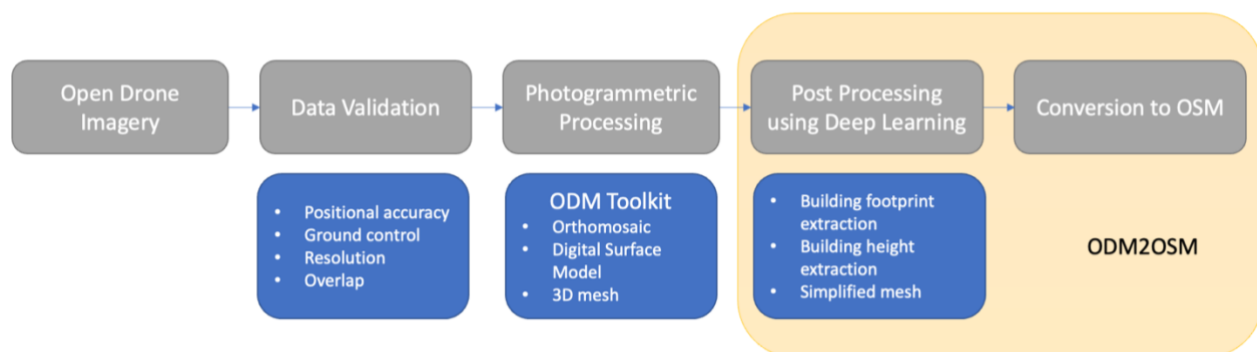


Figure 1: Workflow of extracting and converting drone based building data to OSM format

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