Using open-source high resolution remote sensing data to determine the access to buildings in the context of passenger transport

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Routing on a road network requires geographical points on the road network that correspond best to the addresses of the given origin and destination, here called snapping points. The technique to determine such snapping points is also called offline map matching. Conventional routing machines use the shortest perpendicular distance from a building's centroid to the road network for this purpose. However, in some cases, this technique leads to suboptimal results when the access to a building is not reachable from the road segment with the shortest perpendicular distance. We used open-source data — multispectral images, OpenStreetMap data, Light Detection and Ranging (LiDAR) data — to perform a cost-distance analysis and determined the most likely access to buildings. Therefore, we assumed that the path to the building shows less vegetation cover, minimal slope of the terrain and avoids building footprints. Our results are validated based on a predetermined Ideal Snapping Area for different weightings of the parameters vegetation, slope und building footprints. We also compared our results with a conventional routing machine (Open Source Route Machine - ) that uses the perpendicular distance. The validation-rate of our approach is up to 90%, depending on the weighting of chosen parameters, whereas the conventional routing machine shows a validation-rate of 81%. The optimized snapping points can be used to determine enhanced stop locations in passenger transport to improve services such as door-to-door transportation (e.g. demand-responsive transport).