Object Recognition of Railroad Cables in Rural Areas from Mobile Terrestrial Laser Scanning

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Railroad is one of the leading transportation method both for passenger travels and cargo shipment. Public railroad transportation provides annually 9.64 billion unlinked passenger trips in the EU [1] and 4.87 billion in the USA [2]. Monitoring of the railroad infrastructure is crucial for safety concerns and accident prevention. This task requires regular surveillance which is nowadays still carried out by expensive and time consuming manual visual inspections in many countries.

Automated detection of railroad infrastructure has been addressed based on LiDAR point clouds acquired by mobile terrestrial laser scanning [3, 4] or aerial laser scanning [5]. Powerline cable recognition in these researches depend on previously calculated results, like the position of rail tracks. Additional high resolution ortho-imagery could also be involved [6, 7] for RGB data.

This study is aimed at developing and comparing novel automated data-driven methods based on LiDAR point clouds for railroad cable recognition (contact cables, catenary cables, return current cables) in rural areas. Our approach provides a robust solution by minimizing the assumptions (positions and distances of track bed, rail tracks, etc.) of the algorithm. The employed sample LiDAR dataset used in this study was collected by a railroad vehicle mounted high density mobile mapping system capable of recording 1.1 million points / sec with an accuracy threshold of 8 mm. The acquired point cloud contains ca. 1.54 billion points and covers an approximately 18.5 km long and 130 m width rural railroad segment in Hungary, including georeferenced spatial information (3 dimensional coordinates of the points) with intensity and RGB data attached to the points.

References

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