Target identification is an important process in terrestrial laser scanner (TLS) measurements; however, due to strong competition between manufacturers, the design of laser scanners is kept secret and is usually strengthened by accompanying proprietary software. Moreover, the target identification algorithms (i.e., definitions of the target centre) are not specified. This makes it difficult for users to objectively compare scanners from different manufacturers and to judge the reliability of the captured scan data by a brand scanner and accompanying software. This paper presents a unified general method to complete the process of target identification. The proposed method consists of four major steps: first, determination of the target plane; second, classification of the reflection intensity values and extraction of the border between white and black; third, detection and elimination of erroneous points from step two; and fourth, fitting of the intersection lines and calculation of the centre of the two lines. Because TLS is a reflectorless surveying model that can receive hundreds of signals, its measurements require more stringent objective conditions than traditional measurement by total stations (TS). Therefore, robust estimation methods are used to reduce the influence of random errors; moreover, the model of error-in-value (EIV) is also introduced to deal with captured data. Finally, the target’s centre can be obtained from an iteration process. For the experiments, a Leica HDS 7000...
terrestrial laser scanner, with its accompanying software, Cyclone, and a Leica Laser Tracker AT901 were employed. The performance of the proposed method is compared with Cyclone and some early methods from published studies at different resolutions and distances. The paper concludes that the proposed method can obtain reliable results at the same level of accuracy level as those obtained using accompanying software; thus, it provides an objective means to compare the quality of different scanners. The advantage is that our method only makes use of information provided by all scanners and does not require additional proprietary information that cannot be accessed.

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