

Realignment of Road Network Maps with GPS Tracking Data

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SUMMARY

Road network datasets are widely available either for a fee or for free on the Internet. Unfortunately, some of them are not always accurate and up-to-date. These inaccuracies could cause navigation errors and prove costly to users. Therefore, it is important to devise a useful, efficient and cost effective method to make the datasets more accurate. One way to rectify the dataset quality is to use GPS data collected by GPS enabled navigation devices. When the map is not accurate it is reasonable to assume that the GPS data is more accurate than the map. Thus, GPS tracks can be used to realign the traveled street segments. One can view this as the inverse of the map matching problem. Instead of matching GPS positions to the map, we match the map to GPS tracks (or points).

This paper outlines a comprehensive approach for realigning street segments to GPS data collected from moving vehicles. The process includes GPS data filtering, matching GPS points to existing road segments, shifting the road segments to the GPS points and forming new intersections and vertices. The end result of the process is a revised map of the road segments in their corrected positions. For each of these tasks new algorithms or enhanced existing algorithms were developed and employed. The proposed process was successfully implemented on real world data and the results of the realigned road segments are shown, analyzed and verified. The realigned network showed full agreement with high accuracy orthophoto of the test area.