Accepted Manuscript

Title: Building Road Segments and Detecting Turns From GPS Tracks

Author: Mahmoud Ezzat Mahmoud Sakr Rania Elgohary Mohammed Essam Khalifa

PII: S1877-7503(18)30281-3
DOI: https://doi.org/doi:10.1016/j.jocs.2018.09.011
Reference: JOCS 923

To appear in:

Received date: 18-3-2018
Revised date: 16-9-2018
Accepted date: 23-9-2018

Please cite this article as: Mahmoud Ezzat, Mahmoud Sakr, Rania Elgohary, Mohammed Essam Khalifa, Building Road Segments and Detecting Turns From GPS Tracks, *<![CDATA[Journal of Computational Science]]>* (2018), https://doi.org/10.1016/j.jocs.2018.09.011

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Building Road Segments and Detecting Turns From GPS Tracks

Mahmoud Ezzat[a,1,*], Mahmoud Sakr[a,b], Rania Elgohary[a], Mohammed Essam Khalifa[a]

[a] *Department of Information Systems, Faculty of Computer and Information Sciences, Ain Shams University, Cairo, Egypt*

[b] *Université Libre de Bruxelles, Belgium*

Abstract

With the wide spreading of geo-aware mobile applications, huge amounts of user-contributed GPS trajectories become available with different levels of accuracy. Constructing road maps from such datasets is one important benefit from this data, and it is required for many applications. There are some challenges related to the inaccuracies incurred on real datasets, such as missing GPS signals, low sampling rate and bad driving behaviour. In this paper, we present a new preprocessing algorithm to address the problems of GPS data. Additionally, we present a clustering-based technique to extract the road map from GPS tracks. Firstly, the tracks are simplified in order to extract road turns and remove the noise data. Then, we adjust the points of the simplified tracks to solve the problems caused by the low sampling rate by moving them closer to the positions of the real turns. Afterwards, a progressive clustering is applied to extract turns and intersections. Finally, we connect them to build the road segments. To ensure the accuracy of our results, we compare the proposed technique with two of the best state-of-the-art methods using a small-scale dataset with inconsistent sampling rate. Another experiment is conducted by extracting a part of the road segments of Egypt using a large-scale dataset with more than 12 million GPS points that are captured with high sampling rate. Experimental results show that our proposed technique exceeds the other methods with regard to F-measure.

Keywords: core point, turns, snapping, EPDBSCAN, road segment

1. Introduction

With the emergence of applications that base their functionality on road map data, there is a great interest in automating the process of road map production. Modern applications such as location-based services, navigation, Geo-enabled social networks, etc, require an accurate and up-to-date road map. Continuous updating of these networks is critical for these applications to ensure the safety of the vehicles and avoid the fatal accidents, especially

*Corresponding author

Email address: mahmoud.abdelmobdy@cis.asu.edu.eg (Mahmoud Ezzat)

[1] Tel.: +201226599766

Accepted Manuscript

Download English Version:

https://daneshyari.com/en/article/11263301

Download Persian Version:

https://daneshyari.com/article/11263301

Daneshyari.com