
MAP MATCHING BASED ON FMM ALGORTIHM

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0.1 INTRODUCTION

The report mainly address the map match for larger low sampling GPS trajectory dataset based on the method proposed and developed by Yang and Gidofalvi(2018). However, before process the map match, the data preprocess is necessary. The rest of this report is structured as follows. In section 2, we will introduce road network data preprocess and trajectory dataset preprocess for map match algorithm. Then, The complete installation workflow of map match algorithm(namely FMM) and open software source would be introduced in Section 3. Lastly, a case study is presented. This work is an important preprocessing step in many GPS data relevant studies. Besides, all the preprocess python programming code have been developed and could be download from <https://github.com/huangJianwei1119/Data-Preprocess-for-FMM/blob/master/README.md>.

0.2 DATA PREPROCESS

The FMM algorithm require a GPS trajectory set TR and a road network G as input. In this section, we will introduce how to process our original GPS and Road network dataset for FMM algorithm.

Most GPS trajectories data are recorded as row data which include car ID, latitude, longitude, timestamp, velocity, and statues of the car(occupied or not). Assumption the GPS dataset were stored as .csv file, and the first step is to sort all the dataset by car id and timestamp. Which could be resolved by Pandas library in python. Then, we build a tool to generate a set of GPS trajectory as shapefile based on GDAL library. The source python code also could be downloaded from this introduce github.

For the road network, most of cities could be downloaded from Openstreetmap(OSM). Here we also introduced a python library package 'osmnx' to download street network dataset from OSM by a simple python code. Although the street network from OSM include nodes and edges, the dataset might still have incomplete topology. Besides, users might would like to reconstruct the road network based on length constraints. To address this issue, following introduce three major method.

1. Construct road network by using the function of '*pgr_createTopology*' in PostGIS. More details could be found from link:

https://docs.pgrouting.org/2.2/en/src/topology/doc/pgr_createTopology.html

2. Extracting the 'all' vertices from road dataset by using ArcMap->toolbox->Data Management Tools->Features->Feature Vertices To Points. Then, also extracting the 'start' and 'end' vertices from road dataset respectively. Neatly, processing spatial join from all vertices to 'start' and 'end' respectively. Finally, joining the attribution of 'start' and 'end' with original road dataset, and create source and target for road attribute to construct road topology network.

After data preprocessing, all the GPS trajectory data set could be processed map match in road network.

0.3 FMM DOWNLOAD AND INSTALL ON UBUNTU

A Ubuntu system environment is necessary since the FMM algorithm is developed and implemented on Ubuntu environment. Users might would like to build a Virtual Ubuntu environment based on VMWare workstation or other virtual system platform. The source code of the FMM algorithm could be downloaded from link:

<https://github.com/cyang-kth/fmm>

The details of installation and configuration have been introduced in the source Page.