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Monitoring urban accessibility for freight delivery services from vehicles traces and network modelling

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PURPOSE

The aim of this paper is to develop a method to measure the city accessibility for freight distribution by the use of vans GPS traces. The accessibility was investigated through the travel time estimated along the most frequently used paths and the average speed to connect relevant zones in the city.

The use of GPS data (as Floating Car Data) could improve the knowledge of the road network performances to help different stakeholders providing them reliable feedbacks according to their specific needs and interests.

A PRIORI NETWORK

The method is applied to a dataset collecting more than 360,000 GPS positions in Turin related to vehicles (light vans) of logistics fleets delivering goods all around the city. Data are collected for 28 different vans in a period going from 29th April to 29th May 2017. Each recording includes time and day, latitude and longitude, instantaneous speed and bearing. Only GPS traces collected in working days are included in this analysis.

DATA ELABORATION

Each node of the a priori network is used to detect the vehicle passage timestamp and the time necessary to travel along the selected links is computed.

To increase the chance of vehicle detection, these nodes are set with different diameter options depending on the link type:

- Intersection of two motorways → r = 200 m
- Intersection of two roadlanes → r = 100 m
- Mixed intersection → r = 200 m.

These first analysis concentrate on the traces registered in the time range 9.00 - 12.30 a.m. to capture a larger number of vehicles circulating.

A POSTERIORI NETWORK

The final network, called a posteriori, is derived from the refinement of a priori one thanks to the GPS traces dataset that allow a better definition of the links characteristics previously defined.

RESULTS

The main results underline the influence of FCD integration on the travel time matrices. The third matrix represents a possible accessibility matrix in terms of travel time between main zones of the city (the shortest path is selected on the basis of the travel time).

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