
Abstract

Name: Daniel Galley
Topic: Development of a method to identify transport modes through Floating Phone Data
Advisor: Prof. Dr.-Ing. Manfred Boltze
Dipl.-Ing. Moritz von Mörner

Current surveys, traffic counting and interviews were used to identify transport modes. These methods are often expensive and time-consuming. In addition to the high effort to identify transport modes, the results can be inaccurate. Therefore new ways to identify transport modes are needed. The use of Floating Phone Data (FPD) might be a cost- and time-effective method. FPD are location information in order to help to determine the position of mobile phones.

For these reasons, a method to identify transport modes using FPD has to be developed. During this work different approaches will be developed and the highly promising approach will be realized. This approach will be critically evaluated. Due to the lack of real FPD, they are generated by models using the company PTV's program Visim.

In comparison to other research no data from other sources like acceleration sensors or Apps are used. Only location information available for mobile providers is used.

Two models to generate FPD have been created. One model shows a section of a highway the second one the city center of Darmstadt. Both models simulate a rush hour and a low traffic time. These different scenarios should generate different data able to identify transport modes.

With the data generated in Vissim, FPD as real as possible have to be produced. To archive this, a mobile network has been modeled in Vissim where cell size and handover frequency are determined by using field experiments. The preparation of the data takes place in seven steps. First, the results of incorrect data are adjusted and then a mobile device is assigned to each person in the simulation. The next steps include the provider, to find out if an active connection is present and if a handover is generated. In the final step, local fluctuations are inserted and the final FPD are produced.

With the help of this FPD various evaluation is executed. There are examined studies of one cell change and several cell changes on highway model. In all the methods frequencies are detected trying to identify busses by high points. In addition, methods are developed to identify the busses by

their velocity. Due to the fact that any satisfactory results are obtained for all methods according to a cell change, studies using multiple cell changes are examined. In this case, the IDs are pursued and examined whether these occur in high points. If this is the case at the same IDs in a number of cell changes, a bus is assumed. Even in this analysis no satisfying results can be achieved.

In the city center model the transport modes are distinguished by considering the velocity. There are defined velocity ranges for pedestrians, cyclists, public and individual transport vehicles. As the velocity of public transport vehicles can vary enormously because of stations, a comparison of the cell change is performed using the public transport timetable. This survey is carried out with cyclists as well as with individual transport vehicles. There are good results of identification of pedestrians, cyclists, public transport and individual transport vehicles in the city center model. However, the differentiation between pedestrians, cyclists and individual transport vehicles is only possible via the velocity. If this velocity is low (because of traffic signals) or cyclists have a very high velocity, the transport modes cannot be allocated properly.

The work shows that an allocation of the transport mode does not seem possible only by cell change. The results of the highway model show that the detection of busses is not possible. In the city center model various parameters, which have an influence on the velocity are not considered. Therefore, the good results should be treated with caution.

Despite of the poor detection of transport mode in this work, I appreciate the possibilities of using FPD to transport detection as a good choice. The main difficulties in assessing the statements are the self-generated FPD. To get a concrete statement about the identification of transport mode, all the research carried out must be verified with real data. Only in this way, this work can be quantified. Is it possible to use real data, the use of FPD seems a good alternative to identify transport modes.