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KATINKA – GATHERING A REFERENCE DATA SET OF BICYCLE TRAFFIC FOR TRANSPORT MODELS

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Public space
Transmodal
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Transportation model

Abstract

Active transport modes play an important role in the decarbonization of urban transportation. Transport models and data are important decision supporting tools for infrastructure investments. For active mobility modes only a minimum data quantity and quality is available, an unleveled playing field in decision making processes is predestined.

This paper presents a mixed-method approach to generate a reference dataset for cycling in a certain study area. The approach combines short-term, long-term and permanent bicycle counts together with interviews. The resulting outcome provides a better reference for decision making processes. This enables city- and transport-planners to better assess the effects of actions in the public space for all transport modalities.

By implementing the generated reference data in transportation models that include active modes, it is possible to determine in an objective manner, whether proposed actions in the public space contribute to the aims as posed in traffic strategy and policy documents. This will enable evidence-based improvements for active mobility modes.

1. INTRODUCTION

Mobility surveys, traffic research and transport models are important decision supporting tools for infrastructure investments at all scales. As for active mobility modes only a minimum data quantity and quality is available, an unleveled playing field in decision making processes is predestined.

A true integration of active mobility modes in the strategically important transport models is not present at the moment. Especially as active transport modes play an important role in the decarbonization of urban transportation, improvements of active mode data collection and modelling methods are essential.

The aim of the „KAtinka"-project is to contribute to active mode data collection and modelling methods by the exploration of new data sources and experimentation with implementation of active modes in a transport model.

The main challenge in any modelling application is the availability of knowledge about the "ground-truth" or reference data. Conventional mobility data, such as those gathered in travel diaries, can only be used for macroscopic bicycle models to a certain extent: often the sample is too small and the resolution too low.

It is also known that there is a strong interaction between the different modes of transport. These transmodal effects are often very complex and difficult to survey. Multimodal traffic models are usually just "multiple unimodal" traffic models, that can't depict these strong effects of multimodal trips where bicycle and public transport complement each other (bicycle traffic as a feeder to public transport or taking bicycles on the train).

This paper presents a mixed-method approach to generate a reference dataset for cycling in a certain study area. The mixed-method approach was applied to the city of Graz in Austria.

2. METHODS

In order to extract a reference dataset for cycling in our study area three surveys were conducted:

[1] A traffic (=bicycle) count on a qualifying date

The count was conducted on a working day (April 12th 2021) over a period of 3 hours from 7 to 10 a.m on 37 different locations in the urban area of Graz and along the main bicycle routes.

At each location the number of bicycles, e-bikes and other vehicles (scooter, e-scooter, cargo bike, segway, etc.) were counted for both directions separately and in 15-minute intervals. Within this short period of time more than 10.000 bicycles were counted.

[2] Simultaneous automatic traffic counters

To validate the manual surveys traffic counters were installed on 6 different locations throughout the city of Graz in coordination with the 4 existing

permanent bicycle counting points of the city [1] for 2 whole weeks (April 5th 2021 – April 18th 2021) simultaneously to the other two surveys.

The devices used radar detection to measure the traffic, which also allowed bi-directional counting.

Figure1 shows the locations of the different surveys and the main bicycle routes of the city of Graz.

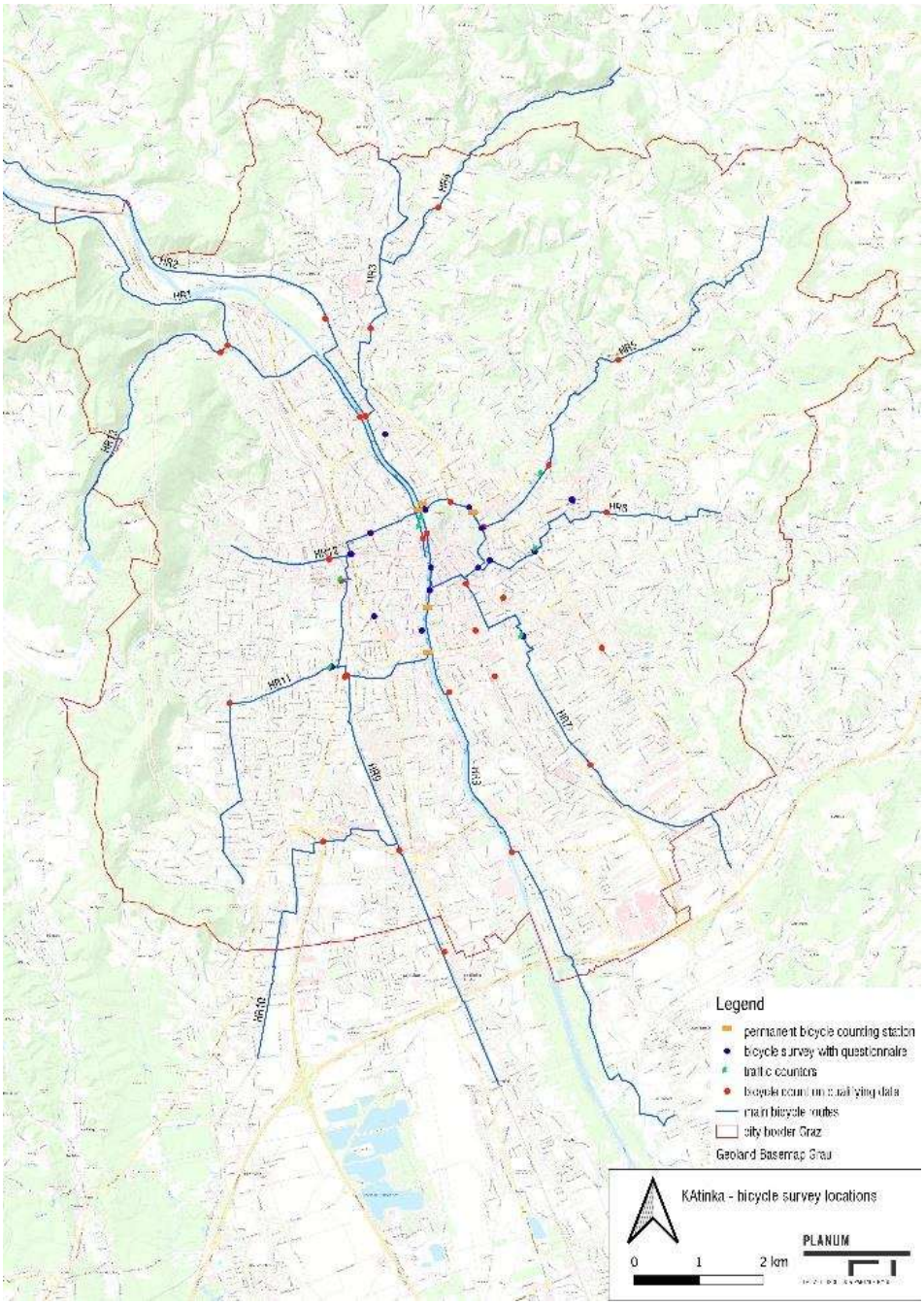

Figure 1. Map of all survey locations

[3] Survey of cyclists at cross-sections in Graz during a 2-week-time-period with questionnaire

The survey was conducted on 16 different locations all over the inner urban area of Graz on 6 working days (Tue, Wed, Thu) within a period of 2 weeks in April of 2021. The survey time was from 6 to 10 a.m. and from 2 to 6 p.m. The questionnaire was designed in digital form, so the survey was conducted with tablets.

The survey had the focus on determining path length distributions according to the purpose of the journey. Above all, the results provide different path length distributions for bikes and e-bikes. The survey was designed to attain a high number of cases. In order to be able to cover all trip purposes, cross-sections have been selected along the main cycle routes of Graz. In addition, the surveys were carried out at intersections with traffic lights, since communication between the interviewer and the person being interviewed is facilitated when stopping and waiting is mandatory.

Only survey sites with sufficient space were selected so as not to hinder the flow of traffic. Ideally, an interview was to be carried out within a traffic light phase. Therefore, only essential questions were asked. These were:

- Origin of the trip (as accurately as possible) and purpose (home, work, shopping, etc.)
- Destination of the trip and purpose

If the interviewee had enough time, additional questions were asked, such as:

- Is there a safe bicycle parking at your source? (you can lock up your bike to something firmly anchored)
- Is there a safe bicycle parking at your destination?
- if e-bike: Is there a charging option for your bike at your source?
- if e-bike: Is there a charging option for your bike at your destination?

At the end of each interview the interviewer stepped aside to finish their report as well as to document the estimated gender (binary) and age (given age groups) of the interviewee.

In this survey 2.437 cyclists were interviewed.

3. RESULTS

The resulting data shows, that about 98 % of the trips had their origin as well as their destination within the urban area of Graz. About 55 % of the trips originated from one specific postal code (8010 = inner city). About 54 % of the trips have their destination within one specific postal code (8010).

It has to be noted, that only 85 % of the interviewees stated the street name of their origin respectively only 39 % of the interviewees the street name AND the exact

house number. For the destination, also 85 % of the interviewees stated the street name, but 48 % the street name as well as the exact house number.

Only 2 % of the bicycles being interviewed were e-bikes; about 0,5 % e-scooters as well as cargo bikes. During the bicycle count on the qualifying date the percentage of e-bikes however was at around 7 % (at all counting locations throughout the city). The low percentage of e-bikes during the questionnaire survey might be ascribable to the fact, that the survey was conducted during the COVID-pandemic and regulations were stricter than usual: therefore, it was advised for the interviewer to minimize the interaction with the interview by reducing the questions asked and by keeping the most possible distance. Some interviewers reported, that the motor of e-bikes is very often very small and hidden, so that they couldn't recognize whether the vehicle was an e-bike or a normal bicycle.

Figure 2 shows the flow map on zip-code level and indicates a very strong inner-city traffic.

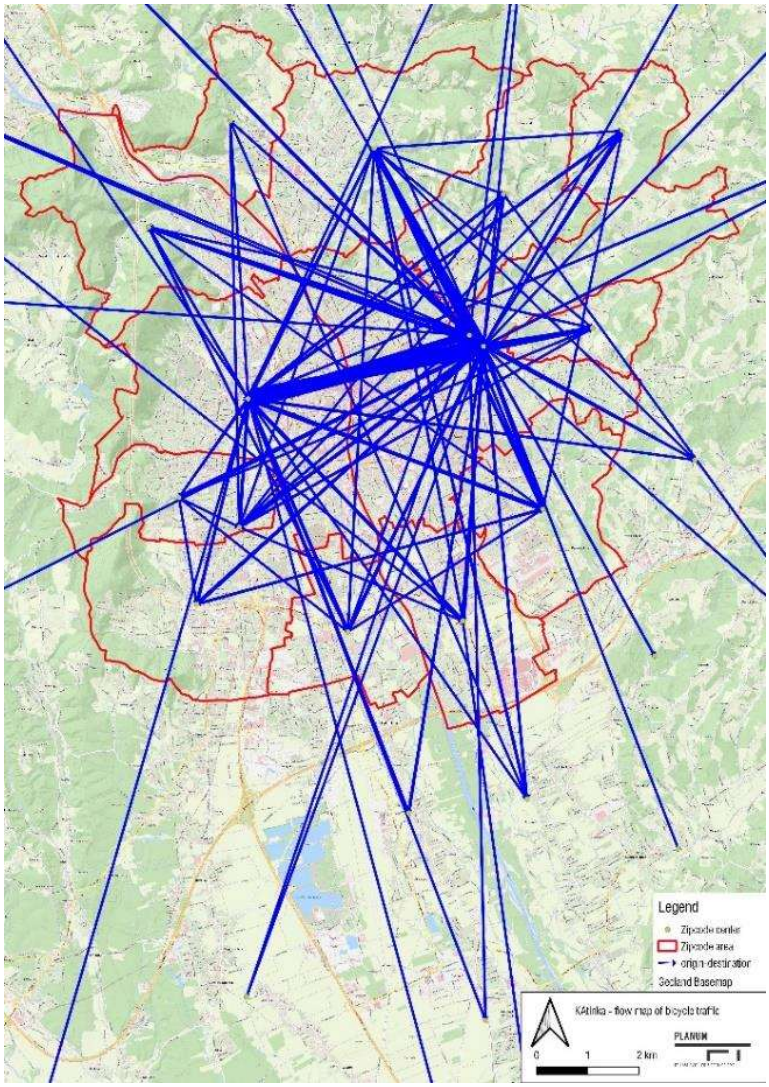

Figure 2. Desire lines – origins and destination on zip-code level

4. CONCLUSION AND OUTLOOK

As identified in the introduction, the main challenge in any modelling application is the availability of knowledge about the “ground-truth” or reference data. This paper presented a mixed-method approach to generate a reference dataset for cycling in a certain study area.

In the next steps, the individual survey results will be combined with data of the permanent bicycle counting stations in order to create trendlines for all 43 temporary counting locations. Through combining counting data with weather observations we might be able to extrapolate bicycle volumes for all 43 temporary counting locations for any given time and weather situation.

ACKNOWLEGDEMENT

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REFERENCES

[1] Permanent bicycle counting stations of the city of Graz, see: https://www.graz.at/cms/beitrag/10116349/8032890/Rad_Zaehlstellen.html#