Simulating bicycle flows in Salzburg, Austria

Poster · July 2018

DOI: 10.13140/RG.2.2.32883.58405

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Simulating bicycle flows in Salzburg

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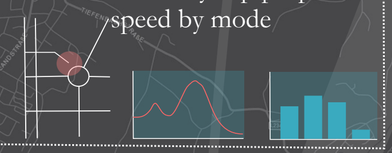
Overview

We developed a bicycle traffic flow model that produces disaggregated spatio-temporal distribution of bicyclists. We took Salzburg region as a study area. The model adopts concepts of the agent-based modelling approach, where every minute of diverse travelling patterns of individuals are reproduced. Based on demographic data, mobility data and assumptions rooted in survey data about bicyclist behavior, every individual selects its activities, transport modes and routes. The resulting heatmap represents bicycle traffic flows over a simulated day at high spatial and temporal resolution. Thus, by instructing the model with simple movement rules on an agent level, emergent model results are able to explain phenomena of bicycle mobility on higher system level. Subsequent consideration of aspects, such as the way people react to traffic jams, weather conditions, leverages the authenticity of the model. Running different scenarios of infrastructure interventions makes it possible to glance at possible changes in the spatial distribution of bicycle flows. The GAMA-platform (http://gama-platform.org) has been selected for the implementation of the model.

Modelling workflow

1 INPUT DATA ACQUISITION
residential data
street network
points of interest
mobility survey data
counting data

2 DATA PREPARATION
network topology check
activity distribution by trip purpose
mode by trip purpose
departure time by trip purpose
duration time by trip purpose
speed by mode



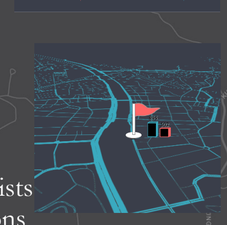
3 CONCEPTUAL MODEL
spatial extend
temporal extend
time step
agent types
agents characteristics
agents behaviour
interactions
output

4 CODE

5 PLAUSIBILITY CHECK
temporal distribution of active bicyclists
spatial distribution of active bicyclists
trip distances
active bicyclists at counting stations

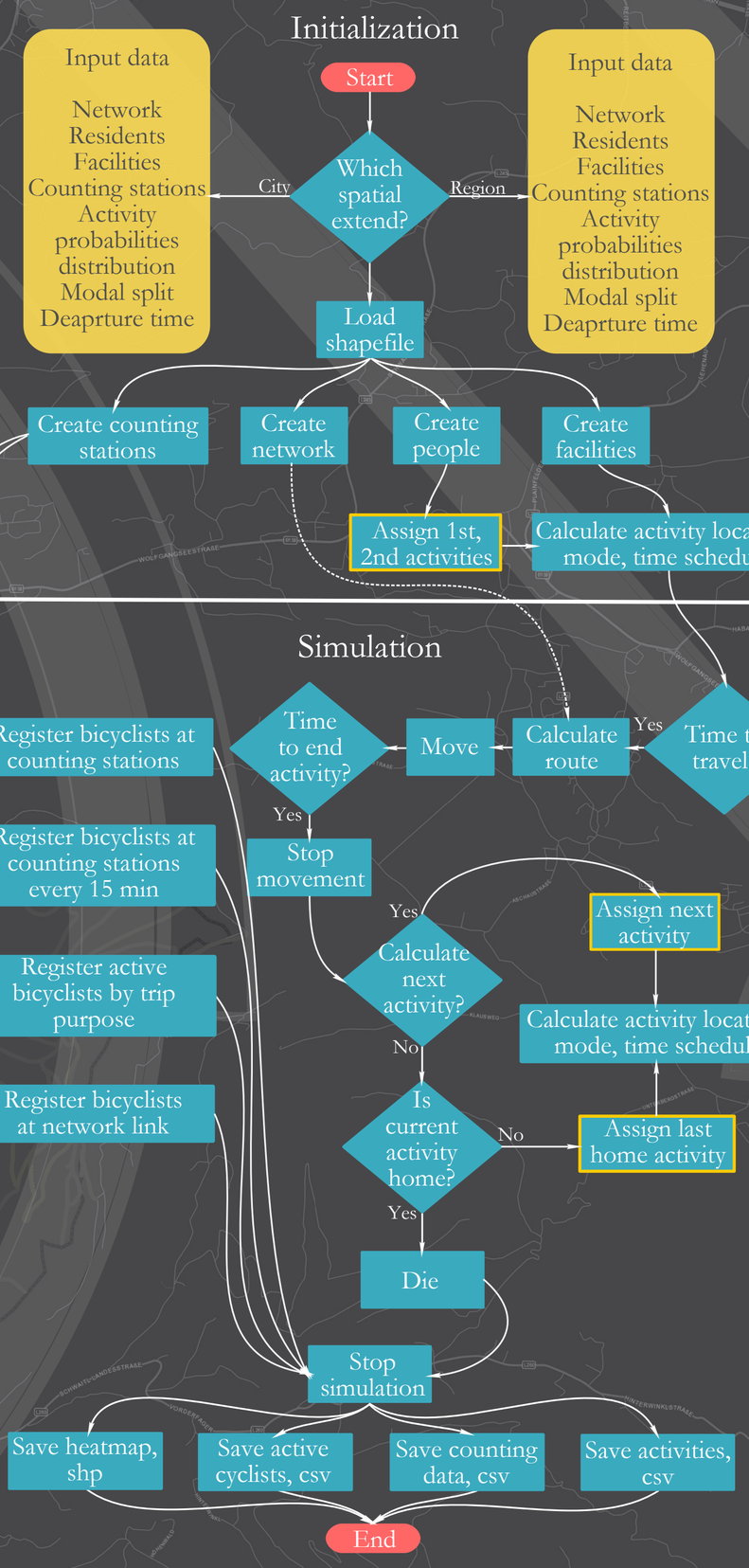
6 ADDING COMPLEXITY
detailed modal split
activity chains
trip distance restriction
departure time probabilities

7 SENSITIVITY ANALYSIS
temporal distribution of active bicyclists
spatial distribution of active bicyclists
trip distances
active bicyclists at counting stations



8 VALIDATION
Number of bicyclists at counting stations

Model flowchart



First results

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Data: gip.gv.at, OpenStreetMap
Created with: ArcGIS Pro 2.1, Inkscape 0.92

This research is partly supported by the Austrian Ministry of Transport, Innovation and Technology under contract FFG 855043. The project FamoS is carried out by TU Graz (ISV), Universität Salzburg (Z_GIS), bikecitiziens, PTV Austria GmbH and ZIS+P GmbH.

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