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ADVANCING ANALYTICS

Maintaining household composition in microscopic travel demand models

INTRODUCTION

Octavius[1], the tour based microscopic travel demand model of Dat.mobility and Goudappel, models daily activity patterns for all persons and households within a predefined study area. Being a microsimulator, the starting point for any application of Octavius is deriving a synthetic population, representing either the current (a reference) population of the study area, or some (expected) future situation (a scenario). In order to determine such a population, a population synthesizer is included in Octavius, of which a schematic overview is shown in Figure 1.

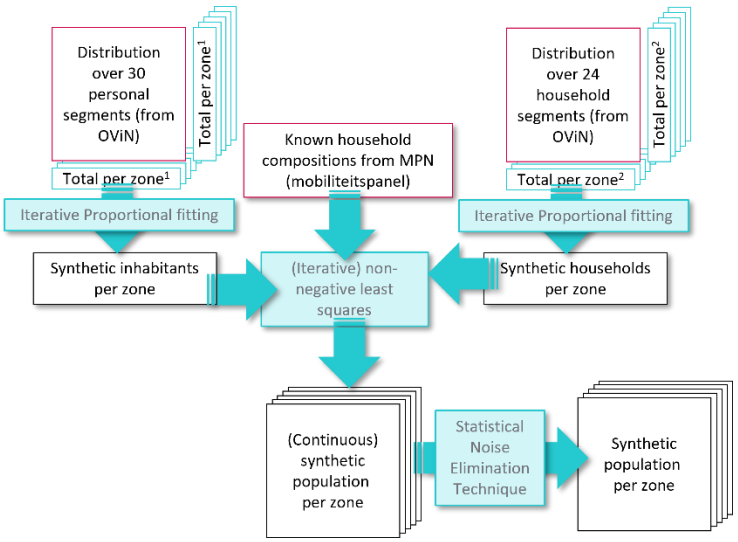

Figure 1: Schematic of the population synthesizer

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In the population synthesizer, a probability distribution over personal and household characteristics for each zone in the study area is determined by combining multiple data sources and applying IPF and INNLS. The result of this process is, for each zone, a weight for each possible household composition. A household composition includes both information of the household and the persons included in this household. In the final step, a discrete synthetic population is obtained by applying the Statistical Noise Elimination Technique (SNET). Each agent in this population makes a number of choices in a sequence of choice models included in Octavius, which all together result in a travel diary for each agent.

PROBLEM DESCRIPTION

As mentioned in the introduction, in the final step of the population synthesizer a probability distribution over households is transformed into a population of synthetic agents. Such a household contains information on the household (e.g. number of cars) and the persons in the household (e.g. age, gender). To create a population with discrete agents, this probability distribution is discretized. In this step the household composition is not maintained, meaning that the household characteristics of agents are stored, but the information on which agents belong together in a household is lost. Moreover, with the method used it is not even necessarily the case that the household data attached to agents would constitute complete households. This inconsistency restricts users of Octavius in the possibility to model dependencies within a household, such as ensuring that no more cars in a household are used than are available.

RESULT / OBJECTIVE

The objective is to adopt or develop a methodology to maintain the household information in the discretization step of the population synthesizer. This could for example be done by adjusting or extending the currently used discretization algorithm SNET or by using a post processing method to reconstruct the household composition afterwards.

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ASSIGNMENT

The assignment consists of researching possible methods for discretizing probability distributions and studying the currently used method. Using this information, the student can develop or adapt a method to keep the household distribution intact while also keeping discretization errors to a minimum. The developed method(s) should be tested on a (theoretical) small travel demand model, and, if time allows, in a case study on a full scale travel demand model.

INFORMATION

When interested in this internship assignment please contact: Peter Klein Kranenbarg (pkleinkranenbarg@dat.nl) or Jesse Voorhorst (jvoorhorst@goudappel.nl). More information on Dat.mobility and Goudappel can be found via www.dat.nl and www.goudappel.nl.

Footnote

[1] https://www.slideshare.net/LuukBrederode/development-of-a-microscopic-tour-based-demand-model-without-statistical-noise2