Determinants of the demand for bus transport -
A model to estimate the number of bus boardings in a neighbourhood

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Regio Twente and the research area (the non-red areas)

A bus in Twente

Generally the demand for and use of bus transport are studied using large zones that correspond to cities or even concession areas. The demand for bus transport is however not equal in all neighbourhoods and other sub zones of these research objects. Differences in socio economic, build environment, and network characteristics result in variations in bus demand. Car-ownership, income, spatial density, frequency and the relative attractiveness of using a bus can all have their own influence.
Being the concession granting authority for the bus transport in the region, Regio Twente wanted to get better insight in the local differences in the demand for bus transport. With this information better decisions considering line, stop or frequency changes can be made in order to improve the efficiency of the bus system. To meet this need this study estimates a model, with zones in three of the municipalities in Regio Twente, that can be used to determine the expected number of boardings given certain neighbourhood's characteristics.

Based on literature study a categorisation and a first selection of possible determinants of the demand for bus transport is made. Subsequently correlation analysis is used to select the variables that can enter the regression models. After that linear regression models are estimated for the number of boardings per inhabitant in a zone, the measure of the demand for bus transport. The most promising models are validated using data of the year that was used to estimate the models and a control year, that lies in the previous concession period. With help of this validation it is determined which model can be used best to determine the number of boardings in a zone.

In the final model the frequency of services per day is the most important determinant of the number of bus boardings in neighbourhoods. Also the address density, the punctuality of services, the percentage of students and the number of jobs per inhabitant are included in the model. All of these variables, but the address density, have a positive relation with the number of boardings per inhabitant, meaning an increase in the variable value leads to an increase of the number of boardings. Interesting is that the sign in front of the address density is negative, meaning that a high density is related to low numbers of bus users. This is caused by the fact that competing modes of transport (bicycle, train) are more attractive in higher density areas.