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VACANCY: Transfer of matrix calibration effects to future scenarios

INTRODUCTION

Strategic transport models are used for measuring the impact of changes in the surroundings and policies on traffic. Often the results of these changes are determined for 10 till 20 years in the future. One of the last steps in transport models is the traffic assignment model. In this step, the traffic is allocated to the network making use of utility of the available routes, based on factors like travel time. This results in a visualisation of the volume of traffic on roads which can be used for deciding on appropriate measures and the prevention of undesirable effects.

Data is also available on how many vehicles are actually using the roads. This information is known for specific points in the network, which we call traffic counts, obtained by for example detection loops underneath the asphalt or manual observation. In the ideal world the modelled volumes of traffic would approach this count data very well, but in reality we often see an unsatisfactory difference between the two. This is where the last step of a transport model comes in, called matrix calibration. In this step, a heuristic is used to match the measured data with the modelled data, such that large discrepancies between model and counts are reduced.

PROBLEM DESCRIPTION

The matrix calibration procedure is used to better match traffic counts. This method is applied to the reference scenario for which both a model outcome and a set of counting points is available. Models are used to give insights into future travel behaviour and the expected effects of taking measures. Therefore future scenarios are made in the traffic model, with the predicted growth in the population and new infrastructure, giving the predicted traffic flows. For these scenarios counting traffic

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is evidently impossible and it is desired to transfer the effect of the matrix calibration procedure of the reference scenario to the future scenario. In this way, the correction due to deviations between model and reality is also applied to future scenarios. The difficulty of the transfer is that one needs to assume what type of changes are made by the matrix calibration heuristic. Changes could for example be seen as a multiplication or addition, but other underlying assumptions can be made.

Different methods exist to transfer the effects of the matrix calibration procedure from the reference scenario to future scenarios (also referred to as the calibration effect), such as the pivot point method as used by e.g. Rijkswaterstaat or the RGM (Regionaal GoederenModel) method as used by Goudappel. These methods modify origin-destination matrices (OD-matrices) which contain the number of trips between any given origin and destination. These matrices are input to the traffic assignment algorithm.

Both methods struggle to find the growth factor between future and reference scenario if cells in the matrix of the reference scenario are close to 0. This leads to difficulties in the case of sparse OD-matrices and scenarios with developments in previously unused areas. Methods exists to overcome these problems, but the quality of the methods varies and can be improved. This is especially a problem when using new model techniques which lead to sparser OD-matrices.

RESULT / OBJECTIVE

The objective of this assignment is to obtain a better understanding of the advantages and disadvantages of several calibration effect transfer techniques. With this information, it should be possible to make an informed decision about the most suitable method of transfer for different model techniques and scenarios. Next to that, an objective is to have better ways of measuring the quality of the result after transfer of the matrix calibration effect. Depending on the background and preferences of the student and study programme, a further objective could be to develop an improved transfer method.

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ASSIGNMENT

We roughly expect the following steps depending on the length of stay of the student:

1. Literature research on existing transfer methods
2. Comparing different methods, both theoretically and in a test case (at least the ones used within Goudappel, but other ideas are welcome)
3. Determine a strategy for measuring the quality of the results after transferring calibration effects in future scenarios
4. (If time permits) Develop a new method for transferring calibration results to future scenarios

INFORMATION

When interested in this assignment, please contact Jesse Voorhorst (jvoorhorst@goudappel.nl) or Lotte Gerards (lgerards@goudappel.nl). More information on Goudappel can be found via www.goudappel.nl.