System convergence in transport models: algorithms efficiency and output uncertainty - DTU Orbit (11/03/2019)

System convergence in transport models: algorithms efficiency and output uncertainty

Transport models most often involve separate models for traffic assignment and demand. As a result, two different equilibrium mechanisms are involved, (i) the internal traffic assignment equilibrium, and (ii) the external equilibrium between the assignment model and the demand model. The objective of this paper is to analyse convergence performance for the external loop and to illustrate how an improper linkage between the converging parts can lead to substantial uncertainty in the final output. Although this loop is crucial for the performance of large-scale transport models it has not been analysed much in the literature. The paper first investigates several variants of the Method of Successive Averages (MSA) by simulation experiments on a toy-network. It is found that the simulation experiments produce support for a weighted MSA approach. The weighted MSA approach is then analysed on large-scale in the Danish National Transport Model (DNTM). It is revealed that system convergence requires that either demand or supply is without random noise but not both. In that case, if MSA is applied to the model output with random noise, it will converge effectively as the random effects are gradually dampened in the MSA process. In connection to DNTM it is shown that MSA works well when applied to travel-time averaging, whereas trip averaging is generally infected by random noise resulting from the assignment model. The latter implies that the minimum uncertainty in the final model output is dictated by the random noise in the assignment model.

General information
State: Published
Organisations: Department of Transport, Traffic modelling and planning
Contributors: Rich, J., Nielsen, O. A.
Pages: 317-340
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: European Journal of Transport and Infrastructure Research
Volume: 15
Issue number: 3
ISSN (Print): 1567-7141
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 0.99 SJR 0.532 SNIP 0.686
Web of Science (2017): Impact factor 1.095
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.13 SJR 0.619 SNIP 0.633
Web of Science (2016): Impact factor 0.619
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.17 SJR 0.507 SNIP 0.817
Web of Science (2015): Impact factor 0.705
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.06 SJR 0.614 SNIP 0.744
Web of Science (2014): Impact factor 0.818
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.36 SJR 0.895 SNIP 1.059
Web of Science (2013): Impact factor 1.023
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.97 SJR 0.703 SNIP 0.936
Web of Science (2012): Impact factor 1.224
ISI indexed (2012): ISI indexed no
Web of Science (2012): Indexed yes