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Modelling the growing use of public transport in Ile-de-France: how ANTONIN 3 addresses the challenge

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Abstract

Ile-de-France, the Paris region, is facing major transport policy challenges. To cope with the previous and forecasted growing use of public transport, restructuration and development of existing lines and achievement of new ones including Grand Paris Express metro are planned. Other transport policy measures are promoted to foster the use of modes alternative to car, such as reduction of roads speed limit or parking policy.

In this context, traffic and demand forecasts are required. They rely mostly on the demand model developed and used by STIF, the regional public transport authority. ANTONIN (ANalysis of Transport Organisation and New INfrastructures) is multimodal and based on disaggregate discrete choice models.

In continuity with already validated methods in the version ANTONIN 2, the third version which will be operational in 2015 brings innovative solutions and up-to-date functionalities aiming to provide reliable and comprehensive forecasts on the wide range of projects planned in the region. This paper presents the major new features, focussing on what issue they intend to enlighten from the transport authority's perspective, how their effects are taken into account in the model and what tests were made to validate and evaluate them.

Keywords: transport policy; strategic model; disaggregate choice model; numerical application

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1. Introduction: ANTONIN 3, a strategic model for the Ile-de-France region

1.1. Challenges for mobility in Ile-de-France

Over the past two decades, Paris region – Ile-de-France – witnessed a significant and continuous increase in the use of public transport. In 2010, 8.3 million daily trips were made on this network, more than 20% of all trips in the region.

The Regional urban master plan Ile-de-France 2030 – adopted by the Regional council in 2013 – and the Sustainable urban mobility plan (SUMP) for 2020 – elaborated by STIF and approved by the Regional council – set the frame of the development of Ile-de-France and identify measures necessary to face sustainability challenges in terms of transport policy. This proactive policy includes the achievement of major new public transport infrastructures, the most known being the Grand Paris Express metro project. It also promotes other types of measures such as restrictive parking policy or reduction of speed limits on the road network in urban areas.

1.2. ANTONIN, an evolving model

Traffic forecasts and cost-benefit analysis of public transport projects rely on ANTONIN (ANalysis of Transport Organisation and New INfrastructures), the demand model developed and used by STIF, the regional mobility authority. Since 2010, 75 traffic forecast studies have been conducted. The model was also used to assess global mobility policy such as the SUMP.

Successive versions of ANTONIN have been developed according to the availability of the regional mobility surveys (Enquête Globale Transport EGT). The first version of the model, estimated on the EGT 1991, set its main features: a multimodal model, based on disaggregate discrete choice models. In 2005, the EGT 2001 was used for the second version which included further improvements (a more detailed zoning of the region, the modelling of non-home or non-work based trips and shorter calculation time). The last update, version 3, is based on the EGT 2010 survey (the update was achieved by the private research institute Significance, The Netherlands).

This paper presents the main features of ANTONIN 3. It explains how it deals (method and results) with the modelling of some of the urban and transport evolutions which will happen in the future years.

2. ANTONIN 3: a sequence of Logit models representing short and long term mobility choices

2.1. General structure of ANTONIN 3

ANTONIN 3 is a disaggregate travel demand forecasting system which covers the whole Ile-de-France region and all modes of transport.

All versions of ANTONIN are composed of the same different sequences: tour generation, joint destination and mode choice, calculation steps to split daily matrices in peak or off-peak and apply a pivot point and assignment to produce traffic flows on networks. ANTONIN 3 is built on CUBE (Citilabs) software, using CUBE Base interface and CUBE Voyager for level of services and assignment; demand calculation is mainly based on specific programs coded in Delphi.

Scenarios require zonal data and networks descriptions. As ANTONIN is mostly designed to estimate changes rather than produce matrices, it has to be applied both for the base year scenario corresponding to the year of the mobility survey data and for a project scenario (for a future year and/or including new projects). ANTONIN uses a pivot point method to adjust base matrices (matrices corresponding to the situation on which ANTONIN 3 has been estimated) to the most precise demand matrices available, estimated using all traffic counts data available for the public transport part of the demand. For future scenario, the mixed pivot method (Daly et al. 2011) enables modelling increase or decrease, even for zones where demand emerges or grows rapidly.