

Paving the way for smart mobility

Modern IT solutions not only give us a better understanding of human mobility behaviour – they also help improve environmental performance and enable intelligent demand management.

TEXT Michael Keller

Raubal studies human mobility by analysing spatio-temporal data. He is particularly interested in discovering whether IT solutions can promote sustainable mobility behaviours. “Whatever technical solutions we introduce to make the transport sector more efficient, we can’t address the challenges involved unless people change their behaviour and attitudes,” he argues.

Multi-modal mobility

Transport experts emphasise the increasing importance of multi-modal travel – in other words splitting a journey across different forms of transport. Done well, this approach reduces CO₂ emissions, shortens journey times and avoids traffic jams.

As part of the GoEco project, Raubal’s team recently carried out a long-term study to discover the best ways of encouraging people to increase their use of bicycles, public transport and car sharing. GoEco, which ran from 2016 to 2017, is the biggest participatory mobility project ever carried out in Switzerland. It was jointly headed up by ETH Zurich and the University of Applied Sciences and Arts of Southern Switzerland (SUPSI).

Trip analysis with feedback

Some 400 residents of the cantons of Ticino and Zurich took part in the GoEco project, using a smartphone app of the same name to keep track of all the trips they made over the course of a year. Drawing on a combination of location data and machine learning, the software verified which modes of transport people used and calculated their energy consumption and CO₂ emissions. The users received regular updates on their mobility behaviour, including suggestions on how to improve their environmental footprint

– for example by taking alternative routes or using more efficient modes of transport. The researchers also tested game elements such as points and competitions designed to motivate people to choose sustainable mobility behaviours.

Subsequent analysis revealed that this approach was largely successful: the participants responded to both the feedback and the game elements, significantly reducing their CO₂ emissions on regular journeys such as their commute to work. The researchers also found some indications of users maintaining their new mobility behaviour on a long-term basis.

CO₂ emission mitigation strategy

Raubal insists that the potential of such multi-modal route planners and environmental feedback tools should not be underestimated. “But it’s essential that the applications are reliable and that they genuinely free up users from the time-consuming tasks of seeking out and comparing different options.” If those criteria are met, his experience with GoEco suggests people are willing to embrace these kinds of decision-making aids.

The Green Class pilot project launched by Swiss Federal Railways (SBB) and various other partners in autumn 2016 demonstrates that people will opt for multi-modal transport if they are given the option – for instance if they can choose freely between different modes of transport. Participants received a combined, one-year mobility package consisting of a first-class travelcard, an electric car, parking at the station, and a subscription to a car sharing and electric bike sharing service. SBB commissioned Raubal’s team to conduct a scientific analysis of the project.

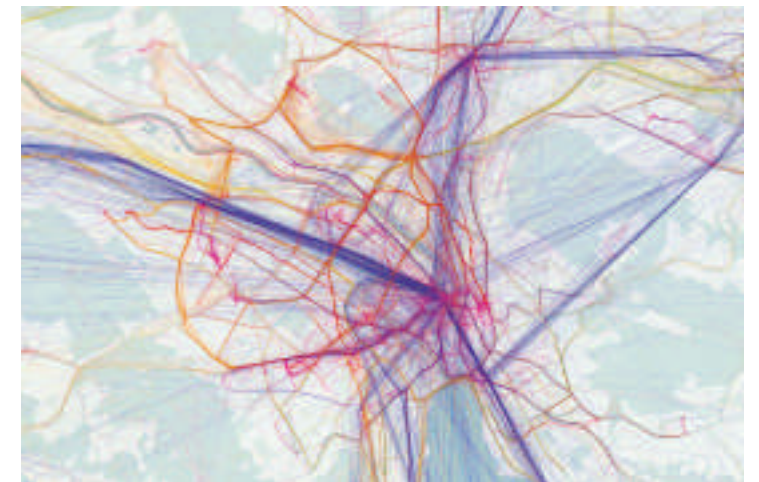
Perhaps the most striking finding was that people used the electric car

for around one-third of the journeys they had previously made in a combustion engine vehicle, in many cases for short, last-mile trips from the station to their home. Frequent train use also emerged as a key part of the mobility mix. “Most participants reduced their CO₂ emissions significantly, even though, overall, people actually travelled more during the pilot phase than they had before,” Raubal says.

Smart mobility management

The results of both of these projects are based on spatio-temporal analyses of all the trips made. The researchers recorded each participant’s location data using the GPS locators in their smartphones and cars. This kind of tracking is fast becoming an integral part of transport management and has witnessed a corresponding increase in use worldwide.

So should commuters be worried about sharing their data in this way? Raubal doesn’t think so: “Protecting people’s privacy is obviously very important, just like in many other areas of our lives, but I think mobility data is less sensitive than people’s health or



Anonymised tracking data from the GoEco project: the different colours of the journeys indicate different modes of transport.

banking data.” What’s more, mobility data is typically processed in an anonymised and aggregated form, because its usefulness really comes to the fore in bulk.

Mobility data ultimately offers the potential to measure entire traffic flows in real time, optimise their control, and carefully manage demand. This will lead to a better understanding of collective mobility behaviour which, in turn, can serve as a basis for making better decisions on intelligent housing policies and spatial planning – in other words, insights into mobility behaviour can be used to design infrastructure in line with demand. Within the scope of the Swiss Competence Center for Energy Research – Efficient Technologies and Systems for Mobility (SCCER Mobility), for example, Raubal’s group is investigating how traffic flows can be used to optimise the layout of future charging stations for e-mobility. “At the end of the day, everyone will benefit if we put our mobility data to reliable and sensible use,” he says. ○

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