

An online monitoring tool for local infrastructure decision makers using smartphone-generated bicycle data

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The improvement of bicycle infrastructure is conditioned by a better understanding of bicycle traffic and road usage. From the cyclists' perspective, quality of travel is traditionally assessed by surveys. Nowadays, a good proportion of cyclists are equipped with smartphones and use bicycle navigation systems that have the ability to record whole travel paths. From these sensor rich data, inconveniences felt during trips that are captured in conventional surveys could potentially be extracted by the derivation of indicators in a cheaper and faster manner. They could offer a wider coverage in terms of number of surveyed people and kilometres travelled, and could help discover revealed preferences as opposed to stated preference. In this context, our partner Geovelo, an award-winning French start-up company, generated more than 30 million kilometres worth of cycling data from French cyclists in less than two years. The aim of our work is to process this data in order to capture aforementioned indicators and to produce a proxy for conventional survey that is updated more frequently and that will help decision makers spot risky or unpractical roads. Because automatic detection is less accurate and less expressive, it is to be stressed that the main goal is to provide a monitoring tool that detects problematic portions of road so that they can be studied more thoroughly by infrastructure specialists, not replace conventional surveying methods.

Steps of the workflow include GPS track pre-processing, cleaning and mapmatching to the infrastructure, the derivation of indicators such as traffic intensity, speed, waiting times, delays, dangerous breaks and road roughness. Finding comparative data obtained from traditional surveys and fixed measuring stations to compare and assess the quality of derived proxy indicators is also essential. Results include the extraction of breaks and delays from one year worth of Geovelo data covering the whole of France and the comparison with survey data from French Cyclists association FUB - Fédération des usagers de la bicyclette - that mapped manual danger and discomfort signallings collected throughout the year 2019. Cycling speed and traffic volumes were extracted and compared to fixed automatic counting stations. As a result, a web-based application will be made available for two groups of local infrastructure decision makers to use and will allow users to request and compare data from any given time frame.