

# A new methodology developed to monitor traffic flow

June 9 2014

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The most recent edition of the scientific journal *Transportation Research Part B*, one of the most recognised in its category, has published the research conducted by Iván Guardiola of the University of Science and Technology of Missouri, Fermín Mallor of the NUP/UPNA-Public University of Navarre, and Teresa León of the University of Valencia. The work has developed a new mathematical methodology to monitor traffic flow so that medium and long-term forecasts can be made.

"If we know not only the volume of the traffic but also the way in which the [flow](#) is taking place, we can detect when the traffic is undergoing a significant change. This information can be used, for example, when decisions are taken about signs ([traffic lights](#), directions, etc.), road capacity, and other aspects," explained Fermín Mallor, Prof of the Department of Statistics and Operational Research.

What is new about this research is that it applies the so-called curve statistics to the specific problem of [traffic control](#) or monitoring. The use of the methodology is illustrated by using traffic [data](#) recorded on an American freeway between 2004 and 2011, although "the methodology, the underlying procedure, can be extrapolated to any spot where we would like to monitor the traffic," pointed out the researcher. It is not just a useful methodology in the context of traffic analysis but when it is properly adapted, it can be applied to the monitoring and control of any phenomenon from which data are gathered at a high frequency rate (something routine thanks to the use of sensors) and whose monitoring is significant for detecting changes (temperature, noise, vibration, etc.).

One of the key aspects of the methodology applied is its capacity to detect changes in traffic flow patterns. This is achieved by combining the functional analysis of data (or curve analyses) and control techniques of a multivariate quality. Curve statistics is a new form of analysis based on the profile or shape that is generated by the data targeted by the study. This mathematical approach allows the data gathered to be put to maximum use by going beyond the traditional analyses based on the creation and study of variables like maximum traffic flow, time it takes to reach maximum flow, total daily flow, etc.

The results make it possible to interpret the main causes responsible for variations in traffic from one day to the next. In the data analysed a very different pattern between working days and public holidays was obtained. It is also possible to quantify the significance of factors like holiday, shopping and travel periods. Its main use, however, is to detect changes in the traffic due, for example, to demographic expansion in nearby areas, the creation of new commercial and leisure areas, etc.

The article highlights four clear advantages in the use of this [methodology](#): the maximum exploitation of the volume of data obtained, the cut in dimensionality, the graphic representation of each daily [traffic](#) profile and the development of a method to take strategic decisions.

**More information:** Guardiola, I., León, T., Mallor, F. (2014). A functional approach to monitor and recognize patterns of daily traffic profiles. *Transportation Research Part B*, 65: 119-136.

Provided by Elhuyar Fundazioa

Citation: A new methodology developed to monitor traffic flow (2014, June 9) retrieved 26 April 2024 from <https://phys.org/news/2014-06-methodology-traffic.html>

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