SPAIN: APPLICATION OF CONNECTED VEHICLE DATA TO IMPROVE ROAD SAFETY IN DIVERSIONS, ROUNDABOUT DESIGN, AND URBAN CROSSINGS

THE PROBLEM

Identifying which segments of the roads present problems for users is difficult for road administrations. Often, it is through the identification of accident hotspots using statistical methods that road operators can determine when a stretch has inadequate design or conditions. Currently, with existing technology, it is possible to use other types of information from the vehicles themselves to help complement this type of identification.

Connected and autonomous vehicles gather and provide a wealth of valuable information for analyzing traffic issues and road safety. Numerous data points are collected every few seconds or minutes. Proper processing of this "big data," including parameters related to the road and the vehicles themselves, allows us to have a better understanding of the traffic conditions on a particular stretch or road. This facilitates the design of measures to improve both the level of service and road safety on that road.

Furthermore, it is possible to analyze the effectiveness of measures implemented in the past because there is a wealth of parameters and information available both before and after the implementation of those measures. It is even feasible to "reconstruct" the traffic conditions leading up to an accident.

In conclusion, through the information provided by connected or autonomous vehicles, traffic can be monitored before, during, and after the implementation of measures. Therefore, proper handling of this data is highly beneficial in the field of improving road safety and traffic conditions.

THE SOLUTION

The increasing connectivity of modern vehicles presents an opportunity for road authorities to understand user behavior on different segments of the road network. This allows for continuous and immediate feedback on how users experience the road, eliminating the need to wait for long periods to identify problematic stretches and accidents.

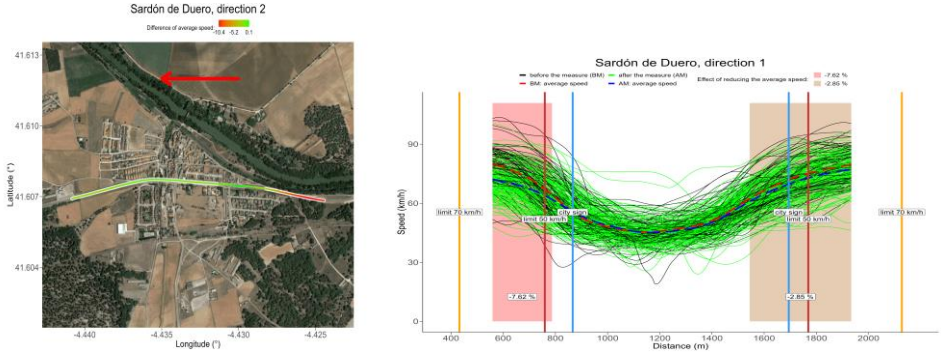
Although the number of these vehicles in circulation is not yet in the majority, they are still representative for certain types of analysis. In Spain, the Directorate General of Roads (DGC) of the Ministry of Transport, Mobility, and Urban Agenda (MITMA) has promoted the use of "big data" provided by connected vehicles to develop actions to improve road safety on Spanish state roads (RCE).

With a proactive approach in mind, the DGC has carried out real-time traffic monitoring to redirect traffic due to construction or other circumstances, maintaining an appropriate level of service, and taking necessary measures in case of potential conflicts or decreased service quality. This has effectively reduced the potential risk of accidents in those areas.

Similarly, the consistency of travel speeds has been analyzed on specific stretches and across a road network to implement speed calming measures for users. Patterns of traffic behavior in urban areas (interurban road sections passing through populated areas) are also analyzed to implement traffic calming measures in similar circumstances.

Some specific applications of this technology in the field of road safety are:

- Before-after studies or analysis to assess the effectiveness of different traffic calming measures.
  To verify the effectiveness of different treatments, it is easy to measure speeds before and after their implementation without the need to install anything on the road or perform on-site measurements.

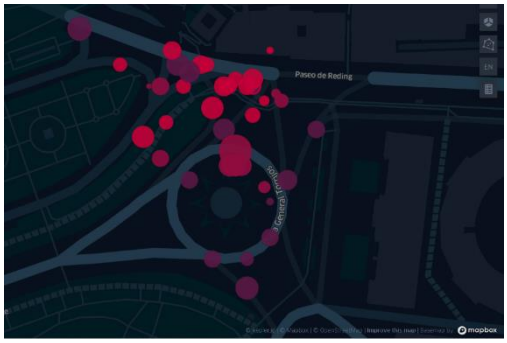


1 Example of speeds before and after the installation of traffic calming devices.

- Study of speed consistency throughout the road network of a province.
  By evaluating the speeds of numerous users across the entire network, it is possible to identify which segments of the network are more inconsistent and may be more dangerous for drivers.

2 Speed Analysis using connected vehicle data and road geometry

3 Speed variations along urban segments of interurban roads



4 Identification of harsh braking concentration spots

THE OUTCOME

The results of these analyses using the information provided by connected vehicles allow for:

- Preemptively understanding which treatments or measures are effective and which are not, through massive data samples, without having to wait for accident trends to evolve over many years.
- Identifying areas and situations that are prone to danger by utilizing user vehicle data and network geometry.
- Identifying traffic behavior patterns in specific circumstances (e.g., urban crossings) to proactively develop designs for safety improvement measures and traffic calming in similar situations.

FURTHER INFORMATION:

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