This topic is “practice ready.” ☒ Yes  ☐ No

License Plate Recognition Technology’s Potential Benefits to ITS:
an ‘Arterial Travel Time Estimation’ Case Study

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Abstract

One of the most important performance measures for both travelers and transportation system operators is travel time. Not only is average travel time essential to drivers, but more importantly, travel time reliability. People tend to remember the few unexpected long travel times that they faced throughout a year. An advanced data collection system is needed to calculate average travel times, analyze travel time reliability and predict future travel times.

Intelligent Transportation System (ITS) devices are commonly used for mass data collection for transportation networks. Two main data collection methods exist: travel time estimation and direct travel time measurement. Travel time estimation averages speeds from specific points into an average link travel time. This approach can lead to inaccurate estimations, especially when the travel time is quickly changing such as during congested traffic flow or on arterials. In addition, point speed estimation methods are not able to include control delays at intersections. In contrast, tempo-spatial vehicle tracking measures actual travel time.

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Some vehicle tracking methods include cell phone multilateration, Global Positioning System (GPS), Bluetooth, toll tag, vehicle inductive/magnetic signature, and license plate recognition. GPS/Bluetooth tracking or probe vehicles require an On-Board-Unit (OBU) and user consent, thus are limited by the percentage of vehicles that are equipped. Toll collection data is restricted to specific toll roads where the toll-collecting infrastructure is available.

Vehicle inductive/magnetic signature (VIMS) identification and License Plate Recognition (LPR) do not need any OBU, leading to a higher sampling rate. To measure actual travel time, each specific vehicle must be identified and matched at two different locations and times. Temporal-spatial vehicle matching contributes not only to travel time measurement, but also to Origin-Destination (OD) demand studies.

This poster aims to comprehensively review the potential applications of LPR and compare its benefits and drawbacks with other available data collection techniques available in ITS literature. In addition, this poster discusses a vehicle re-identification case study on an arterial to illustrate the high potential of LPR for use in actual travel time and OD studies. The successful vehicle re-identification rate of the case study was 91%, while most other vehicle matching studies in the literature have matching rate of less than 50%.

Keywords: License Plate Recognition — Arterial Travel Time — Vehicle Re-identification — Vehicle Tracking