

Traffic flow reconstruction using mobile sensors and loop detector data

In 87th TRB Annual Meeting Compendium of Papers DVD, Transportation Research Board.
Washington D.C., January 13-17, 2008. (18pp)

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Abstract

In order to develop efficient control strategies to improve traffic conditions on freeways, it is necessary to estimate the state of the traffic accurately in space and time. Using data collected from stationary detectors—such as loop detector stations—the density field can be currently reconstructed to a certain accuracy. Unfortunately, deploying this type of infrastructure is expensive, and its reliability varies based on public funding. This article proposes and investigates new algorithms that make use of data provided by mobile sensors, in addition to that collected by stationary detectors, to reconstruct traffic flow. Two approaches are proposed and evaluated with traffic data. The first approach is based on data assimilation methods (so-called nudging method or Newtonian relaxation) and the second is based on Kalman filtering. These approaches are evaluated using traffic data. Results show that the proposed algorithms appropriately incorporate the new data, improving significantly the accuracy of the estimates that consider loop detector data only.