Use of Taxi-Trip Data in Analysis of Demand Patterns for Detection and Explanation of Anomalies

Because of environmental and economic stress, current strong investment in adaptive transport systems can efficiently use capacity, minimizing costs and environmental impacts. The common vision is of a system that dynamically changes itself (the supply) to anticipate the needs of travelers (the demand). In some occasions, unexpected and unwanted demand patterns are noticed in the traffic network; these patterns lead to system failures and cost implications. Significantly, low speeds or excessively low flows at an unforeseeable time are only some of the phenomena that are often noticed and need to be explained for a transport system to develop a better future response. The objective of this research was the formulation of a methodology that could identify anomalies on traffic networks and correlate them with special events by using Internet data. The main subject of interest in this study was the investigation of why traffic congestion was occurring as well as why demand fluctuated on days when there were no apparent reasons for such phenomena. The system was evaluated by using Google’s public data set for taxi trips in New York City. A “normality” baseline was defined at the outset and then used in the subsequent study of the demand patterns of individual days to detect outliers. With the use of this approach it was possible to detect fluctuations in demand and to analyze and correlate them with disruptive event scenarios such as extreme weather conditions, public holidays, religious festivities, and parades. Kernel density analysis was used so that the affected areas, as well as the significance of the observed differences compared with the average day, could be depicted.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Contributors: Markou, I., Rodrigues, F., Pereira, F. C.
Pages: 129-138
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Transportation Research Record
Volume: 2643
ISSN (Print): 0361-1981
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 0.83 SJR 0.589 SNIP 0.708
Web of Science (2017): Impact factor 0.695
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.75 SJR 0.557 SNIP 0.81
Web of Science (2016): Impact factor 0.592
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.6 SJR 0.612 SNIP 0.821
Web of Science (2015): Impact factor 0.522
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 0.58 SJR 0.562 SNIP 0.876
Web of Science (2014): Impact factor 0.544
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.76 SJR 0.635 SNIP 0.958
Web of Science (2013): Impact factor 0.556
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.6 SJR 0.573 SNIP 1.062
Web of Science (2012): Impact factor 0.442
ISI indexed (2012): ISI indexed yes