

Big Data Applications for Transportation Planning

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Abstract : "Big data" refers to extremely vast and complex sets of data, encompassing extraordinarily large and intricate datasets that require specific tools for meaningful analysis and processing. These datasets can stem from diverse origins like sensors, mobile devices, online transactions, social media platforms, and more. The utilization of big data is pivotal, offering the chance to leverage vast information for substantial advantages across diverse fields, thereby enhancing comprehension, decision-making, efficiency, and fostering innovation in various domains. Big data, distinguished by its remarkable attributes of enormous volume, high velocity, diverse variety, and significant value, represent a transformative force reshaping the industry worldwide. Their pervasive impact continues to unlock new possibilities, driving innovation and advancements in technology, decision-making processes, and societal progress in an increasingly data-centric world. The use of these technologies is becoming more widespread, facilitating and accelerating operations that were once much more complicated. In particular, big data impacts across multiple sectors such as business and commerce, healthcare and science, finance, education, geography, agriculture, media and entertainment and also mobility and logistics. Within the transportation sector, which is the focus of this study, big data applications encompass a wide variety, spanning across optimization in vehicle routing, real-time traffic management and monitoring, logistics efficiency, reduction of travel times and congestion, enhancement of the overall transportation systems, but also mitigation of pollutant emissions contributing to environmental sustainability. Meanwhile, in public administration and the development of smart cities, big data aids in improving public services, urban planning, and decision-making processes, leading to more efficient and sustainable urban environments. Access to vast data reservoirs enables deeper insights, revealing hidden patterns and facilitating more precise and timely decision-making. Additionally, advancements in cloud computing and artificial intelligence (AI) have further amplified the potential of big data, enabling more sophisticated and comprehensive analyses. Certainly, utilizing big data presents various advantages but also entails several challenges regarding data privacy and security, ensuring data quality, managing and storing large volumes of data effectively, integrating data from diverse sources, the need for specialized skills to interpret analysis results, ethical considerations in data use, and evaluating costs against benefits. Addressing these difficulties requires well-structured strategies and policies to balance the benefits of big data with privacy, security, and efficient data management concerns. Building upon these premises, the current research investigates the efficacy and influence of big data by conducting an overview of the primary and recent implementations of big data in transportation systems. Overall, this research allows us to conclude that big data better provide to enhance rational decision-making for mobility choices and is imperative for adeptly planning and allocating investments in transportation infrastructures and services.

Keywords : big data, public transport, sustainable mobility, transport demand, transportation planning

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