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**Title**

Dynamic public transit accessibility analysis using actual transit operation data

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Abstract

Understanding temporal variability in public transit accessibility is crucial for improving mobility and service quality in public transit systems. To accurately measure this variability in actual traffic conditions, this study utilized General Transit Feed Specification (GTFS) and the Advanced Public Transportation System (APTS) to calculate door-to-door travel time based on real public transit operation data. Recognizing that recurring and non-recurring congestion can co-occur, this study proposed two distinct metrics, Standardized Integral Accessibility (SIA) and Rate of Integral Accessibility Change (RIA), to independently identify temporal variability caused by recurring and non-recurring congestion. By using Integral Accessibility, this study effectively represented the regional public transit accessibility in Busan Metropolitan City, South Korea, revealing variations based on geographical location and the extent of the public transit network. Furthermore, the SIA metric allowed for the identification of accessibility changes during commuting times due to adverse weather conditions. Additionally, the study investigated the impact of heavy rain on accessibility variability using the RIA metric. It was found that variability caused by heavy rain occurs unpredictably at different times and locations, sometimes interacting with recurring congestion. The RIA metric proposed in this study has the potential to monitor real-time variations in accessibility caused by unexpected events. These findings can significantly contribute to the continuous improvement and management of public transit systems to better serve passengers' needs in various traffic conditions.

Keywords

Public Transit, Dynamic Accessibility, Real-time analysis, General Transit Feed Specification