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Spatio-Temporal Analysis of Traffic Congestion on Residents' Exposure to Air Pollution: A Big Geodata Approach

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Extended Abstract

Understanding traffic congestion-related air pollution becomes crucial for urban planning and human health management. However, previously coarse resolution data-based analyses lack a detailed perspective on dynamic exposure to traffic congestion-induced pollution. To address this gap, this study employed high spatio-temporal resolution traffic congestion data collected every five minutes to identify the distribution patterns of traffic congestion-induced air pollution in space-time and the changes in emotions of people affected by traffic congestion. Combining land use and population density data, we estimated the number of people affected by air pollution.

Results show significant peaks in air pollutant emissions during weekday morning and evening rush hours, with total emissions on weekdays being twice as high as on weekend. The residential areas are most affected, accounting for about 60% of the affected population. Public service areas, such as schools and hospitals, which include 20% of the affected population, also experience high pollution levels, suggesting potential health risks for vulnerable groups. Negative emotional changes in people affected by traffic congestion also show distinct patterns, peaking during morning and evening rush hours.

Our findings provide insights into the spatio-temporal dimensions of traffic congestion-induced air pollution, laying a foundation for health-oriented urban planning.

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