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Prototyping an AI-Based waste monitoring and salubrization route optimization system

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Abstract

The paper presents the development and experimental validation of a functional prototype for automated waste monitoring and dynamic salubrization route optimization. The system employs an IP camera to periodically capture static images of waste containers at predefined intervals. Each image is processed using a vision-based analysis module that estimates container fill levels using discrete values of 0, 50, 80 or 100 percent. The average fill level is computed, and a binary decision rule is applied: when the average is greater than or equal to 50 percent, collection is required; otherwise, the status remains normal. The results are stored in a CSV log and displayed through an automatically generated web-based dashboard using red and green status indicators. When the threshold condition is met, the system automatically invokes the Google Routes API to generate an optimized collection route, which is opened in Google Maps. Experimental validation using two real containers demonstrated correct status classification and successful end-to-end route triggering, confirming the operational feasibility of the proposed system.

Keywords: *computer vision; real-time monitoring; route optimization*

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