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Development of drone-based computer vision-assisted pavement distress detection (Phase 2)

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Abstract: Evaluating road damage conditions makes informed maintenance decisions. Distresses, such as cracking, diminish pavement functionality and reduce its service life. However, a thorough evaluation should also consider additional factors, such as obstructions (e.g., vehicles, large trees, shadows, and wet areas), to provide a comprehensive assessment of road conditions. Traditional road inspection methods are time-consuming, hazardous, and susceptible to human error. Therefore, automating the classification of pavement conditions can streamline road inspection and maintenance processes. Unmanned aerial vehicles (UAVs) have proven to be effective tools for rapidly collecting data, particularly in remote areas where assessing damage can be difficult. In this project, the proponents investigated new methods that can accelerate drone-based computer-vision assisted pavement inspection. The contributions of this work are summarized in three parts: (i) an AI-driven road lane tracking system, (ii) a new cascaded reconstruction and localization method of a 2D road map given UAV imagery, and (iii) a software application with AI-recommended reports.

Key Words: Aerial Systems: Applications; Automation Technologies for Smart Cities; Computer Vision for Transportation; Deep Learning Methods; Object Detection, Segmentation, and Categorization

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