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Assessment of UAVS Usage for Flexible Pavement Inspection Using Gcps: Case Study on Palestinian Urban Road

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Abstract

Rehabilitation plans are developed based on pavement condition assessments, which are integral to modern pavement management systems. However, these methods present challenges for road maintenance and repair due to limitations such as seasonal factors, low accuracy, visual errors, time consumption, and high costs. Ongoing and efficient monitoring of existing pavements is necessary, requiring reliable tools that can function in all weather and traffic conditions. Unmanned aerial vehicles (UAVs) provide a promising alternative for various tasks, such as road inspection, dam monitoring, and creating 3D ground models and orthophotos. Their accessibility, affordability, and safety make them an attractive option. This research aims to use the mentioned technology to assess asphalt damage severity and type. Ground control points (GCPs) were used in vertical photogrammetric mapping to create 3D road models, which were then processed and analyzed using Agisoft Photoscan software. The software enabled the detection and measurement of patch areas, rut depths, and crack types on the pavement. Results showed high accuracy compared to field surveys, with errors of approximately ± 3 mm in rut depth and ± 2.44 cm² for patch and pothole areas. This study highlights the potential of GCPs to enhance UAV image accuracy, especially in challenging weather and traffic conditions.