

## **Practical consideration for bridge inspection and condition assessment using unmanned aerial vehicles**

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### **ABSTRACT**

In the field of bridge inspection, efforts to introduce inspection methods using unmanned aerial vehicles (UAVs) equipped with imaging equipment have been increasing recently in order to replace visual inspection by professional workers. It is expected to make the inspection process much safer, faster and more cost-effective. In addition, it can cover the area where it is too hard to reach by inspectors. However, this strategy is still in an early stage because there are many challenging issues to be addressed for real implementation. In this study, a typical bridge inspection procedure using UAV which consists of three phases (i.e., the pre-inspection, inspection and post-inspection phases) is first described. Also, the challenging issues are identified from the practical perspective (e.g., localization of a UAV under the bridge (i.e., GPS shadow environment), acquisition of high-quality images for whole region of interest, processing of huge amounts of images, etc.) and their possible solutions are discussed by taking a look at the currently developing techniques such as the graph-based SLAM (simultaneous localization and mapping) algorithm for location estimation of an UAV, the image quality assessment and enhancement algorithm, and deep learning based automated damage identification algorithms for classifying, localizing and quantifying several damage types (e.g., cracks, corrosion, spalling, efflorescence, etc.) in an automatic manner. Finally, the condition assessment for member level, span level, and bridge level can be sequentially performed based on the quantified damage information.

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