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Vegetation Cover Estimation Using Convolutional Neural Networks

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摘要

Vegetation is an important parameter in all bio- and ecosystems, and it should be monitored to conserve and restore the environment. This paper presents a design and implementation of a compact system for vegetation cover monitoring, which consists of a small?unmanned?aerial?vehicle?(UAV) equipped with four different cameras (RGB, NIR, NDVI, and red). These cameras simultaneously record videos and wirelessly send them to a ground station that applies on them a set of algorithms to construct a mosaic representing the covered area and segment vegetative regions. Mosaicing is performed using a fast multi-threaded approach based on binary descriptors. For segmenting vegetation, two scenarios are tested by using convolutional neural networks (CNNs). The first scenario trained a CNN using the images obtained from the four cameras, and then used it with the constructed mosaics. In the second scenario, we trained individual CNNs using images from each of the four cameras individually. The performance of the former scenario exceeded the others from the perspective of accuracy. Moreover, it proved to be highly comparable to previous approaches utilizing level sets, while the processing time is reduced. The proposed approach obtained high accuracy in terms of the Dice similarity coefficient (97 %), which demonstrates its favorable performance.

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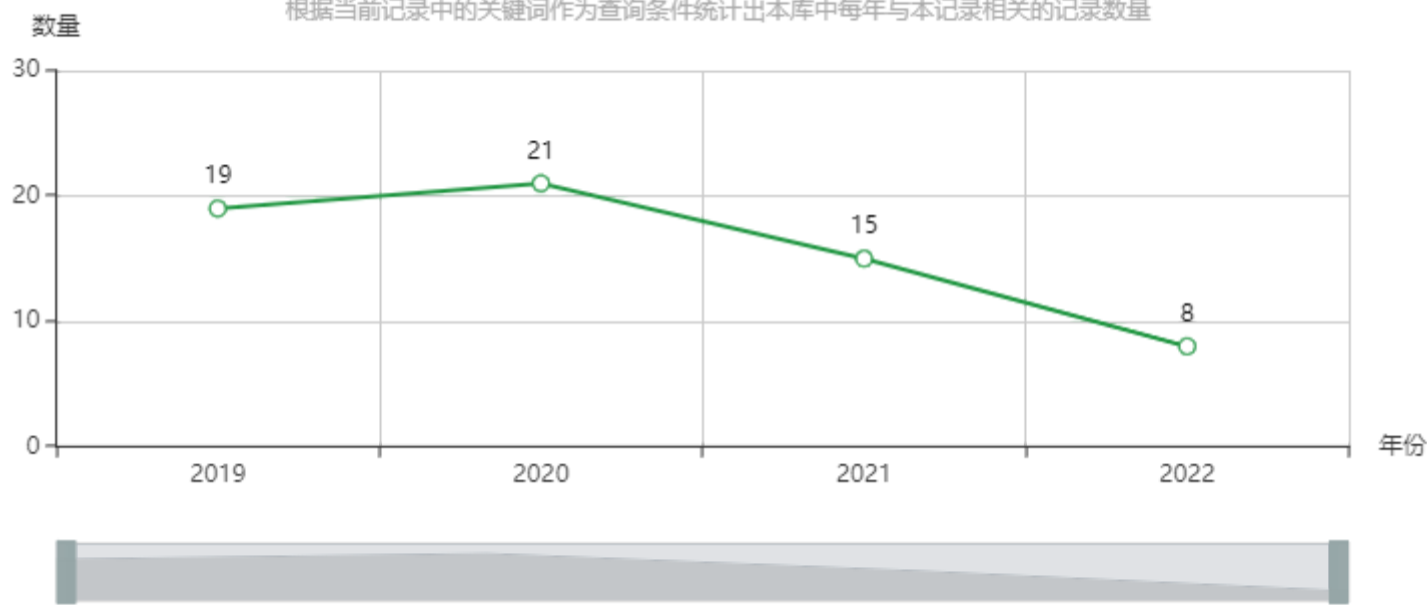
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