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(57) Abstract :
Our ecosystem is mainly focused on the wildlife. But the most common hazard in forests is forests fire. They pose a threat not only to the forest wealth (both flora and fauna) but also seriously disturbing the biodiversity and environment of a region. During summer, when there is no rain for months, the forests become littered with dry leaves, which could burst into flames ignited by the slightest spark. Smoke produced by wildfires is usually visible much earlier than flames. Hence, early detection of wildfire smoke is essential to prevent severe property losses and heavy casualties from catastrophic wildfires. To achieve the best camera coverage and detection accuracy with limited budget, an intelligent video smoke detection algorithm and an optimal wildfire camera placement strategy are in a critical need. In this invention, we propose an efficient video smoke detection framework designed for embedded applications on local cameras. And framework is designed in such a way that smoke is detected early, and minimal usage of remote cameras is done. We also formulate the wildfire camera placement problem as a binary integer programming problem to minimize the overall fire risk of a given area. Case studies on real-world videos are carried out to validate the accuracy as well as the computational and memory efficiency of the proposed smoke detection framework. In this product, we propose an efficient video smoke detection framework designed for embedded applications on local cameras. It consists of two modules. In the first module, the original video frames are processed by local binary patterns and a dense optical flow estimator. In the second module, the produced features are then fed into a lightweight deep convolutional neural network, which serves as a binary classifier to detect the presence of smoke. We also formulate the wildfire camera placement problem as a binary integer programming problem to minimize the overall fire risk of a given area.

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