New automatic forest fire detection system by using surveillance drones

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Fire detection with FFDI in different scenes. Credit: CITSEM-UPM

Researchers from UPM are developing a method to detect forest fires by using a new color index. The index is based on methods for vegetation classification and has been adapted to detect the tonalities of flames and

smoke.

Via color treatment, researchers from the Research Center on Software Technologies and Multimedia Systems for Sustainability (CITSEM) at Universidad Politécnica de Madrid (UPM) have detected forest fire and the smoke created during combustion,and isolated these visual components from the rest of the scene. Due to the rapidity and precision of detection, the use of this innovative system is focused on environmental surveillance systems using drones. This study has been published in the journal *Sensors*.

A research line developed at CITSEM is the application of image-processing surveillance systems for phenomena with impacts on the environment, including deforestation, fires and floods. In short, researchers propose these types of early detection systems in order to detect such events and prevent further environmental disasters.

In the case of deforestation, researchers suggest various algorithms that allow them to detect the fire and smoke generated during a forest fire as well as their fundamental characteristics (area, wind direction…). The algorithms have high accuracy in real time, and they have low computational load that allows them to address the problem in real time and implement such algorithms in autonomous systems (drones) and perform continuous monitoring.

A relevant aspect of the new algorithm, called the Forest Fire Detection Index (FFDI), is its capacity to detect fire from any perspective, including aerial. Additionally, its effectiveness has been proven by using the algorithm in non-forest environments.

The method could be used in real-time in unmanned aerial systems with the aim of monitoring a wider area than through fixed surveillance systems. This could result in more cost-effective outcomes than

conventional systems implemented in helicopters or satellites. These drones could also reach inaccessible locations without jeopardizing people's safety.

The authors write, "We carried out diverse detection tests using commercial drones and the results confirm the utility, efficiency, versatility and low cost of the developed algorithm, becoming an efficient tool for surveillance and monitoring of such events."

More information: Henry Cruz et al. Efficient Forest Fire Detection Index for Application in Unmanned Aerial Systems (UASs), *Sensors* (2016). DOI: 10.3390/s16060893

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