

Emerging Methods for Early Detection of Forest Fires

LITERATURE SURVEY

1. Shixiao Wu, Libing Zhang - Using Popular Object Detection Methods for Real Time Forest Fire Detection

Abstract: In this paper, we focus on three problems that surrounded forest fire detection, real-time, early fire detection, and false detection. For the first time, we use classical objective detection methods to detect forest fire: Faster R-CNN, YOLO (tiny-yolo-voc, tiny-yolo-voc I, yolo-voc.2.0, and YOLOv3), and SSD, among them SSD has better real-time property, higher detection accuracy and early fire detection ability. We make the fire and smoke benchmark, utilize the new added smoke class and fire area changes to minimize the wrong detection. Meanwhile, we adjust YOLO's tiny-yolo-voc structure and propose a new structure tiny-yolo-vocI, the experiments proves that this improves the fire detection accuracy rate. This paper is very practical for forest safety and real time forest monitor.

Link: <https://ieeexplore.ieee.org/document/8695482>

2. Georgi Dimitrov Georgiev, Georgi Hristov, Plamen Zahariev, Diyana Kinaneva - Forest Monitoring System for Early Fire Detection Based on Convolutional Neural Network and UAV imagery

Abstract: Forest fires are one of the main reasons for environmental degradation. In their early stages, the fires are hard to discover, so a faster and more accurate detection method can help minimize the amount of damage they can inflict. In this paper, we present an approach for autonomous early fire detection, which is based on a system with high degree of reliability and with no need of service or human interaction. To provide the autonomous capabilities to the proposed system, we have developed an object detection method, based on a convolutional neural network, which is presented in the main part of the paper. In order to have a better field of view over the observed area, instead of traditional lookout towers and satellite based monitoring, we use live video feed from an unmanned aerial vehicle (UAV), which patrols over the risky area. To make better predictions on the fire probability, we use not only the optical camera of the UAV, but also an on-board thermal camera. With the help of the software platform Node-RED, we have developed a web-based platform, which can present the acquired data in real-time and can notify the interested parties. The workflow for the development of the web-platform is also described in this paper.

Link: <https://ieeexplore.ieee.org/document/9299566>

3. Kartik Trivedi, Ashish kumar Srivastava - An energy efficient framework for detection and monitoring of forest fire using mobile agent in wireless sensor networks

Abstract: Forest fire (or wildfire) has been a great threat to the depleting greenery of the earth. If reserved forests of any country catches wildfire, it suffers great damage. So, it is essential to detect the fire early in order to preserve the forest. Wireless Sensor Networks (WSNs) has been a boon in wildfire detection and monitoring. Timely detection of wildfire is possible with the use of WSN. The use of Mobile Agent (MA) in WSN has helped in increasing the lifetime of energy. This paper introduces a framework that incorporates the use of MA in WSN that can help in faster detection of forest fire and monitoring of it with minimum consumption of energy.

Link: <https://ieeexplore.ieee.org/document/7238433>