



# **KCG COLLEGE OF TECHNOLOGY**

Karapakkam, Rajiv Gandhi Salai, Chennai- 600097

## **Emerging Methods for Early Detection of Forest Fires Literature Survey**

### **Team Members :**

- Praveen Jeevanantham(311019106052)
- Prasanna Venkatesh G(311019106050)
- Sankaravalli S(311019106063)
- Mohan Raj (311019106040)

# 1.Early Forest Fire Detection Based on Deep Learning

**Authors :** Mengna Li; Youmin Zhang; Lingxia Mu; Jing Xin; Ziquan Yu; Han Liu; Guo Xie

**Published Month & Year :** November 2021

**Project Description** : Early fire detection is very important for preventing forest fires. In this paper, a new image-based fire detection algorithm, named as h-EfficientDet, is proposed to complete the task of early forest fire detection. h-EfficientDet is based on a popular deep learning approach EfficientDet (scalable and efficient object detection) by replacing the nonlinear activation function swish of the EfficientDet with the hard version of swish and combining also with an efficient feature fusion network BIFPN (bidirectional feature pyramid network), which can improve significantly the efficiency of the fire detection model. The experiment results show that the proposed h-EfficientDet can detect the fire in real-time with the detection speed of 21 FPS. The detection accuracy is up to 98.35% with a low miss detection rate.

Forest is one of the precious natural resources, which provides great help for human survival and development. However, forest fire is a major problem threatening the world, especially the large-scale and large-area forest fire, which damages the natural ecological environment and wastes a lot of resources in the fire rescue [1]. To reduce the loss of forest resources, it is important to detect the early fire as soon as possible and then put out the fire in time.

## **2.Forest Fire Detection Using Classifiers and Transfer Learning**

**Authors :** Pranav Agarwal; Gaurav Jha

**Published Month & Year :** August, 2021.

**Project Description** : Application of fire detection is gaining a lot of attention due to the increasing threat from global warming that causes a lot of economic distress and threat to public safety. There are over 200,000 forest fires each year which destroys a total area of about 3.5-4.5 million sq. km [1]. The current detection methods involve the use of sensors whose data usually depends on pressure and temperature of the environment. Often these conditions are met when the fire gets out of control. This paper demonstrates various methods to detect fire from photos of the site using transfer learning and image processing. The methods demonstrated in the paper uses about 3500 images of forest fires and 1900 images of forests with no fire to train the models. These methods can detect fire at initial stages compared to existing methods of fire detection. Using only cameras instead of multiple sensors reduces the cost and makes this system more efficient. In this paper we show the comparison of different convolution neural network (CNN) based pre-trained models used for the feature extraction of the images via transfer learning. The paper shows the comparison of different convolution neural network(CNN) based pre-trained models used for the feature extraction of the images via transfer learning. Transfer Learning transfers knowledge from the source base to the target base. It uses the pre-trained neural network trained on large datasets on small datasets.

### **3.Detection of Forest Fire using Convolutional Neural Networks**

**Authors :** A. Sheryl Oliver; U. Ashwanthika; R. Aswitha

**Published Month & Year :** September, 2020.

**Project Description** : Forest fire is a dangerous condition when an uncontrolled, unexpected fire occurs in forests. It is extremely spontaneous and very difficult to control that damages millions of hectares of land and poses serious dangers not only to the ecosystem but also to humans. Hundreds of fires occur every year due to different reasons: seasonal dry spells, thunderstorms and volcanic ignition. Forest fires pose significant environmental issues, causing economic and environmental destruction and endangering human lives. For several nations a big issue is the occurrence of forest fires coupled with the inability of fire services to contain them effectively. These countries are also developing new strategies for controlling. Timely identification is one essential element to control such a phenomenon. Several classification approaches have been proposed, but there are disadvantages in the proposed models that lead to inefficiency and inability to produce accurate results. A novel Convolution Neural Network algorithm if and when used provides high efficiency, accuracy, and comparatively less data-training stress when compared to the supervised machine learning algorithms that require manual data-training. The results obtained using this technique have been studied and an accuracy of 94.3 percent has been reported.

## **4.An insight to forest fire detection techniques using wireless sensor networks**

**Authors** :Pradeep Kumar Singh; Amit Sharma

**Published Year & Month** : January, 2018.

**Project Description** : Fire is a threat to our forests. Human intervention is one the major cause of forest fires. In addition to destroying wooden areas fire jeopardizes our safety. The risk of forest fires has increased in Hilly around the globe in recent past years due to development and building constructions. In order to detect the forest fire several attempts have been made using different techniques from optical fire sensor, satellite based methods and wireless sensor networks. Early detection of forest fire is most important and may save the resources and wealth of forest. In this paper, we have analyzed the existing forest fire detection techniques limited to wireless sensor networks only. Numbers of popular wireless sensor network based forest fire detection techniques have been explored and their merits along with the demerits are reported during the findings.Early detection is the primary way for reducing the damages of forest fires hazard. Wireless sensor networks can detect and monitor fires among forest in real time and immediately in comparison to the satellite based techniques. Satellite based detection is more popular method for detection of fire but their long duration of scanning and low resolution limits the efficacy of using satellite based systems. In wireless sensor network, sensors in large amount are deployed in a forest.

## **5.IoT based forest fire detection system**

**Authors :**Trinath Basu Miriyala,Ragipathi Karthik,J Mahitha,V Lokesh Reddy

**Published Month & Year :** March, 2018.

**Project Description** :Forest fire is also called as wild fire or wildland fire is an uncon-trolled fire occurring in forest areas It is essential to distinguish these sorts of flames as ahead of schedule as conceivable in order to keep the harm from it to biological framework. Consistently a large number of sections of land of timberland are burned to the ground. The land were woods is singed it winds up plainly diffi-cult to develop vegetation over yonder. This is on account of soil moves toward becoming water repellent and acknowledges no more water, prompting lessening in ground water level. The Glob-al Warming Report 2008 says rapidly spreading fire as one of the real reason behind increment in an Earth-wide temperature boost. In late year 2016 more than 4000 hectares of timberland were singed in the slopes of Uttarakhand. Common causes of wild fire are lightning, extreme hot and arid weather and human careless-ness. The utilization of wireless sensor in this paper presents one of the methods for early wild fire identification. Another technique is the utilization of satellite framework to dis-tinguish the wild fire. The primary segments of the framework are satellite(s) and the base station that gathers the information send by the satellite(s) and runs the dissecting calculation.