

FIRE DETECTION ALGORITHM USING IMAGE PROCESSING TECHNIQUES

Kumarguru Poobalan¹ and Siau-Chuin Liew²

Faculty of Computer Science and Software Engineering, University Malaysia Pahang,
Lebuhraya Tun Razak, 26300 Gambang, Pahang, Malaysia
kumaraguru01@gmail.com¹
eliewsc@gmail.com²

ABSTRACT

Lately fire outbreak is common issue happening in Malays and the damage caused by these type of incidents is tremendous toward nature and human interest. Due to this the need for application for fire detection has increases in recent years. In this paper we proposed a fire detection algorithm based on image processing techniques which is compatible in surveillance devices like CCTV, wireless camera to UAVs. The algorithm uses RGB colour model to detect the colour of the fire which is mainly comprehended by the intensity of the component R which is red colour. The growth of fire is detected using sobel edge detection. Finally a colour based segmentation technique was applied based on the results from the first technique and second technique to identify the region of interest (ROI) of the fire. After analysing 50 different fire scenarios images, the final accuracy obtained from testing the algorithm was 93.61% and the efficiency was 80.64%.

Keywords: Fire Detection, Image Processing, Signal Processing.

1. Introduction

Application of fire detection as tool has increase to due to the frequent occurrence of extended fire with consequences on human health and security. This current detection methods which are based on electronic sensors are usually depend on heat and pressure sensors. However those methods has a fatal flaw where they will only work when a certain condition has been reach. In the worst case scenario is the sensors are damaged or not being configure properly can cause heavy casualty in case of real fire. To solve these problems in electronics surveillance cameras being installed. Due to this there is an increase of need for fire detection based on computer vision for such devices. Such devices include a wide range of CCTV, wireless camera even to UAVS

These type of systems offer several distinguish advantages over those traditional detection methods. For example the cost of using this type of detection is cheaper and the implementation of this type system is greatly simpler compare to those traditional methods. Secondly the response time of fire detection system is faster compare to any other traditional detection methods since a vision sensor-based fire detection system does not required any type conditions to trigger the sensors and it has the ability to monitor a large area depends on the camera used. The most benefit of these type of system is the fire source can be saved in a form of image or video which can used for promoting the diversification of the fire detection method greatly.

In this paper, we proposed an algorithm which combines colour information of the fire with the edge of the fire information. Then with the combined results from both this techniques, a parameter is created to segment out the necessary details from the images to detect and identify the fire.