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## A SURVEY ON: FIRE DETECTION USING IMAGE PROCESSING

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**Abstract:** Many people die and property destroy due to fire. To reduce this loss of life and property from fire, an early warning is very important. Fire increase rapidly, we want to detect and control on that fire. A fire detection system based on light detection and analysis is proposed in the paper. For detection system uses different technique such as sensor, multi-feature fusion, edge detection, colour models with given conditions to separate orange, yellow, and high brightness light from background and ambient light. Fire growth is analysed and calculated based on frame differences. The proposed model yield accurate detection of fire location and gives less false rate.

**Keywords:** Fire Detection, Flame Detection, Fire Video, Colour Segmentation, Image Processing

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## INTRODUCTION

Fire detection causes a huge loss to human life and property, hence early detection of fire is very important. Fire detectors, smoke detectors and temperature detectors have been widely used to protect property and give warning of fires. The methods like sensor based methods have many disadvantages: they have transmission delay; they are applicable for indoor regions and cannot be used for outdoor regions to monitor a large area. The vision based fire detection has many advantages: a large area can be monitored, the exact location of the fire can be located and can be fabricated along with the surveillance camera. In order to facilitate earlier detection of fire, and to monitor the spread of the fire, we propose a fire detection system based on light detection. This system uses color models with given conditions to separate color. The system will trigger an audible alarm and provide visual images of the fire as a red box over the image of the fire. There is a trend to replace conventional fire detection techniques with computer vision-based systems.

The fire detection performance depends critically on the performance of the flame pixel classifier which generates areas on which the rest of the system operates. The flame pixel classifier is thus required to have a very high detection rate and a low false alarm rate. There exist few algorithms which directly deal with the flame pixel classification in the literature. The flame pixel classification can be considered both in grayscale and in color video sequences.

## I. LITERATURE REVIEW

Turgay Çelik, Huseyin Ozkaramanl, and Hasan Demirel et. al., in 2007 describe models for fire and smoke detection using image processing is provided. The models use different colour models for both fire and smoke detection. The colour models are extracted using a statistical analysis. The extracted models can be used in complete fire/smoke detection system which combines colour information with motion analysis.

Çelik and Demirel et. al., in 2008 describe a rule-based generic color model for flame pixel classification. The proposed algorithm uses YCbCr color space. The proposed color model can be used in fire detection in video sequences. They shows that the proposed algorithm performs well in segmenting fire regions in video sequences.

Juan Chen et. al., in 2010 describe a video flame detection method based on the multi-feature fusion .The temporal and spatial characteristics of flames, such as ordinary flame movement and color clues. The flame flickering detection algorithm is incorporated into the scheme to detect fires in color video sequences. Gaussian mixture model method is firstly adopted to

extract moving foreground and then detected moving objects and categorized into candidate and non-candidate flame regions by using a flame color filtering algorithm. The flame flicker identification algorithm based on statistical frequency.

Turgay Celik et. al., in 2010 describe conventional fire detection systems which uses physical sensors to detect fire. Chemical properties of particles in the air are acquired by sensors and used by conventional fire detection systems to raise an alarm. These algorithm can be used in parallel with conventional fire detection systems. A fire color model is used CIE  $L^*a^*b^*$  color space to identify fire pixels. The motion information of fire is also be considered to characterize fire regions.

Yu-Chiang Li and Wei-Cheng Wu et. al., in 2012 describe visual based fire detection technologies can detect fire. They proposes an effective visual fire detection method that combines the statistical fire color model and sequential pattern mining technology for detection of fire in an image. They combines the adaptive background subtraction method to extract fire objects and flame rules to detect fire pixels.

YAN Yunyang, GAO Shangbing, Wang Hongyan and GUO Zhibo et. al., in 2012 describe fire detection based on sequences of images. Color and contour are both the important features of a flame image. The method to extract the contour feature of a flame image is developed based on threshold of flame area. The edges of the burning flames jitter continuously, but their contour are similar to each other. The method to detect flames in video sequences is proposed based on flame's dynamic contour.

Shidong Wang and Juan Chen et. al., in 2012 describe method for video flame detection based on multi-feature fusion. Flame color filtering algorithm was used to extract flame candidate regions from video frames. The flame candidate regions were categorized into dynamic candidate regions and static non-candidate regions by using XOR algorithm. A flame flicker identification algorithm based on flame brightness variation was used to extract flames from dynamic flame candidate regions. Numerical filters were constructed to identification of fire flames based on their color, motion and flickering.

MENGXIN LI, et. al., in 2013 describe a video based fire detection technology is become the focal point. They has clear to see that video based fire detection technology can be divided into two main areas that is characteristics detection of flame and smoke. If the optimal algorithms can be adopted for each part of detecting motion area and extracting fire characteristics. The flame and smoke detectors can be divided into the following five parts: obtaining video images,

processing video images, detecting motion area, extracting fire characteristics and determining fires.

Jianzhong Rong, DechuangZhou, WeiYao, WeiGao, JuanChen, JianWanga et. al., in 2013 describe fire detection algorithm based on the color, motion and pattern characteristics of fire. These fire detection algorithm uses a rule-based generic color model and traditional GICA (Geometrical Independent Component Analysis) model, a Cumulative Geometrical Independent Component Analysis and (C-GICA) model was developed for motion detection without static background and a BP neural network fire recognition model based on multi-features of the fire pattern was developed.

Jareerat Seebamrungsat, Suphachai Praising, and Panomkhawn Riyamongkol et. al., in 2014 describe a fire detection system based on light detection and analysis is proposed. This system uses HSV and YCbCr color models. Fire growth is analyzed and calculated based on frame differences.

## **PROPOSED METHOD**

Proposed system consists of three phase with are explain below:

In the first phase, video will be collected from data source and convert video into sequences of images for further evaluation so that the process of further detection has been started.

In the second phase, the image will be color segmentation. Color segmentation is a technique with segment fire from its background. Fire location are detect with help of color.

In the third phase, differences between two consecutive frames are calculated. This technique has been check fire growth. Frame differences is used to reduces false detection of fire and improve accuracy of overall model.

## **CONCLUSION**

In this paper, I have surveyed different fire detection technique. It has been concluded that all the techniques are good for detection of fire which having their own advantages and disadvantages, but the color segmentation is used to clearly describe fire image. The proposed method predicts the fire accurately than the previous method.

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