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Research Article

Robust flame detection using edge driven Gradient and controller unit for fire detection

J.K.Ezhilarasi[1], S.Arunesh[2], Mukilan.A.K[3], R.Charu prasath[4], P.Prem kumar[5]

ABSTRACT

The smart fire detection system proposed in this paper was fully developed and tested to demonstrate its feasibility and effectiveness. The inability to access and control the remote locations is one of the major reasons loss of control over fire activities going on inside deep forest leads unrecoverable losses to wild animals and causes major threats to the forest nature. Here automation will be done by sending control message which is based on the response received from the microcontroller unit. On the other side interrupt protocol will be used to get the notifications while monitor fire using vision based applications.This color gardient enabled remote monitoring will be activated based interrupt protocol for real time video surveillance.

***Index terms*:** Image Transformation, Flame Detection, Drawbacks

I. INTRODUCTION

Forests play numerous vital roles in nature. They can fertilize and stabilize the soil, cycle nutrients, moderate climate, purify water and air, store carbon, supply habitats for wildlife and nurture environments rich in biological diversity. In ad dition, forest products industry offers a vast number of jobs and contributes billions of dollars to a country's economic wealth. Unfortunately, every year millions of hectares of forest are damaged by fires and a great deal of personnels, facilities and money are expended to extinguish these fires . Forest fires have become a severe natural danger which threatens ecological systems, economic properties, infrastructure, and Flame lives. Take Canada as an example, Canada's forests cover a vast area of land which is more than 10% of the world's forests. How Canada manages its forests is, therefore, a global concern. Unfortunately, more than half of the world's natural forests have been destroyed over the past 50 years due to forest fires and poor management of forests. As reported by the Insurance Bureau of Canada, the estimated total cost reaches $3.58 billion by the forest fire occurred at Fort

[1]VelTechHighTechDr.Rangarajan ,Dr.Sakunthala Engineering College Avadi,Chennai. Mailid@xyz.com
[2]VelTech HighTech Dr.Rangarajan, Dr.Sakunthala Engineering College Avadi,Chennai
[3]VelTech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College Avadi,Chennai
[4]Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College Avadi,Chennai
[5]Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering CollegeAvadi,Chennai

This disaster is considered as the most expensive for insurers in the country's history. Currently, almost all forests are in danger from such natural, Flame-made, and environmental risks, as well as global warming and extreme climate 1 change. Fighting forest fires is thereby seen as one of the most important issues in the natural resources protection and preservation. In particular, because the fast convection propagation and long combustion period of forest fires, early detection of forest fires is considered to be a prominent way of minimizing the destruction that fires may cause .

II. METHOD OF WORKING

The method proposed in this chapter works well in any vision-based applications for detection and tracking of fires. This algorithm eliminates the requirement of templates of each objects need to be track which is separate methodology for images. Here, the idea is to decompose the forest schene object accurately into unique multiple regions and detected automatically based on gradient information's and, thereafter, applying vector matching to track detected objects.

Image Transformation

In image processing color space model is a three-coordinate system used to visualize color. There are different ways to represent this three dimensional color space each model retain its own characteristics about image. The conventional Cartesian coordinate systems such as RGB and CMY represent primary and its complementary colors respectively. And other side cylindrical-coordinate system each channels are characterized by its Brightness and Chromaticity

During detection and tracking, distinguishing moving eyes from static becomes an important task, since shadows caused by moving objects create many complications, object shape distortion, and complex texture pattern in the background. To refining the performance of eye tracking shadow detection plays a significant role in.

FLAME DETECTION

Flame detection is a basic computational block in systems related to vision-based Flame action recognition, and major issues related to Flame detection is appropriate discrimination over background objects. Detecting Flames in video frames is a challenging task owing to their variable scale changes and appearance and the range of illuminations that they can adopt. However, most the existing works neglect dynamic changes in the background and cluttered backgrounds under difficult outdoor illumination conditions; and the scale variations in detected regions is also affecting the quality of the final detection rate. The major contributions of this work are: the implications of the histogram of gradient approach in the realm of sports video sequences; the design of a cell size; and orientation directions to explore the edge components of different spatial regions and carried out symmetric and asymmetric vector matching for Flame detection obtained from various unstable environments.

The extracted HOG descriptor is used to explore the location of Flame body and its spatial appearance. In this framework, the number of feature vectors used for detecting the

spatial region is normalized, since the vectors are loosely correlated over different parts of the regions detected. Furthermore, it is a critical point to matching the vector components by means of Flame detection system. This chapter focuses on the problem of Flame detection from varying illumination and environmental conditions.

However, searching of every vector matched for subsequent localization requires lots of computational time and appropriate optimization is carried out to reduce the size of the feature space being searched and improve computational performance. Since Flame detection and location identification usually affects the performance of the overall vision recognition system, it is important to employ a good Flame detection algorithm. However, several challenges are associated with Flame detection. This chapter considered the problem of Flame detection with respect to various illumination and environmental conditions. It is observed from the literature review that the detection rate of any object detection algorithms were in conjunction with the feature dimensions and its insensitiveness of feature model over scale-oriented problems. In order to make the system robust with respect to different illumination and scale variations, the feature vectors has to be normalized for the following reasons.

III. IMPLEMENTATION OF ALGORITHM

Static and dynamic characteristics of the input flameimages are used for fire detection and classification.

Machine learning based classification approaches are used for final classification measures

DRAWBACKS

- Vision based forest fire detection is not possible.
- Computational time is very high
- Sensor modules are not used for early detection

WORK PLAN

- Use sensor inputs to detect the fires or smokes and send interrupt signals to GSM codec
- To process input video sequence using gradient measures
- To estimate its angle of projection using dynamic threshold bounds
- Send direction of fire movement to GSM codec.

IV. RESULT AND DISCUSSION

Automated GSM notifications is enabled based on triggers provides by controller unit. Automated color gradient & color statistical measure based fire detection model.Covariance based dimensionality reduction(PCA) followed by SVM based classification is proposed

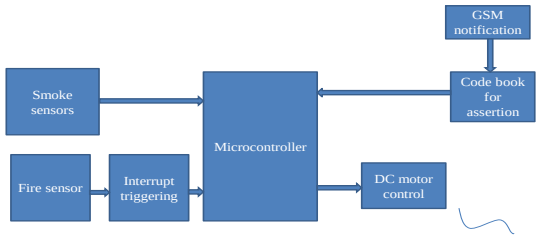
METHODOLOGY

Methodology of the system is used to detect fire and send a SMS alert using the GSM network once it is detected. The ATMEGA microcontroller which serves as the heart of the entire system enables access to real time state of the system. It receives the perceived parameter during fire, detect breach in sensor circuit limit set by comparing the sensed with the pre-set limit. If the sensed value is more than the pre-set limit, the ARDUINO microcontroller sends a signal, else the system remains connected. When the sensor trips of the system, an SMS alert is sent to the utility mobile phone via the GSM network.

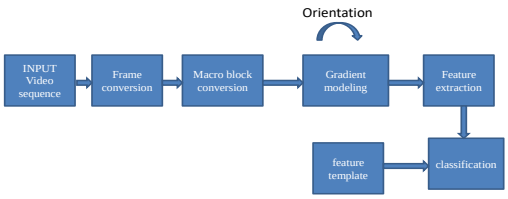
ADVANTAGES

. Using second order derivatives the orientation of fire flames can be estimated.
. Low cost.

BLOCKDIAGRAM



Color gradient model – Fire detection



V. CONCLUSION

The aim of the Smart forest fire monitoring and notification system is to provide the real time information about the fire occurrence and fire control activities issues. This can solve the problems of fire congestion, and associated inconvenience to a certain extent. The Smart fire detection System aims to provide cost efficient compatible system & to provide most reliable system to adjust the time in fully automated way.

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