

LITERATURE SURVEY ON FOREST FIRE DETECTION

Abstract

Fire detection at an early stage is important for the safety of the people. Lack of information due to manual detection is the main cause of failure of fire detection. Fire can be detected by using smoke at an early stage as it is the fire indicator. Generally automatic forest fire detection using image processing techniques represents one of the significant aspects of forest fire avoidance earlier. Detection using image and video is effective than using sensors. In image processing the inputs for the fire detection may be an image or a video but the input as a video is quite complex process but provides good result. The techniques such as Wavelet decomposition, spatial and temporal analysis, Gaussian Mixture Model, Multi-Feature fusion detect fire in an accurate manner.

1.Introduction

Wildfires are a significant hazard to ecological systems around the world and pose a serious threat to human safety. People visually look for signs of fire or smoke appearance to detect fire in older days. To detect fire at early stage we use smoke which is the good indicator of fire which is visible before flames. Characteristics of smoke need to be considered such as transparency, its response to environmental condition, its shape. In open environment smoke detection pose a serious challenge in such areas sensors may be used but this has limitations such as time and wide area coverage. To overcome this video fire detection systems are used. Different image processing techniques can be used to detect fire and smoke. In image processing image or video is taken as input and the output may either an image or parameters or characteristics of an image. Various tasks like analysis classification, extracting the features, recognizing different patterns can be performed using image processing. The features and textures of smoke can extract using various image processing techniques. By using these techniques the dangerous situations caused due to fire can be avoided and safety of the people can be preserved. Fire detection at an early stage is important for the safety of the people. Lack of information due to manual detection is the main cause of failure of fire detection. Fire can be detected by using smoke at an early stage as it is the fire indicator. Generally automatic forest fire detection using image processing techniques represents one of the significant aspects of forest fire avoidance earlier. Detection using image and video is effective than using sensors. In image processing the inputs for the fire detection may be an image or a video but the input as a video is quite complex process but provides good result.

2. Literature Survey

Surapong Surit, Watchara Chatwiriya [1] proposed a method to detect fire by smoke detection in video. This approach is based on digital image processing approach with static and dynamic

characteristic analysis. The proposed method is composed of following steps, the first is to detect the area of change in the current input frame in comparison with the background image, the second step is to locate regions of interest (ROIs) by connected component algorithm, the area of ROI is calculated by convex hull algorithm and segments the area of change from image, the third step is to calculate static and dynamic characteristics, using this result we decide whether the object detected is the smoke or not. The result shows that this method accurately detects fire smoke.

Osman Gunay and Habiboglu [2] proposed a system based on Covariance Descriptors, Color Models, and SVM Classifier. This system uses video data. Spatio-temporal Covariance Matrix (2011) [3] is used in this system which divides the video data into temporal blocks and computes covariance features. The fire is detected using this feature. SVM Classifier is used to filter fire and fire-like regions. This system supports only for clear data not for blur data.

Cheng (2011) [4] proposed a fire detection system based on Neural Network; here neural network is used in detection information for temperature, CO concentration, and smoke density to determine probability of three representative fire conditions. RBF neuron structure is used, the information regarding temperature, CO concentration, and smoke density are collected and data fusion is used to generate fire signal decision. The detectors have continuous analog outputs, when detection limit is exceeded the hardware circuit sends a local fire indication to fusion center, this force the system detectors to generate final decision. Single-sensor detector is used to generate the final decision.

3. Conclusion

Different fire detection techniques have been proposed for safety and protection of the people and environment. It is very crucial to develop an appropriate detection system to avoid dangerous situation caused due to fire. Though fire detection using image produce satisfying result we now go for fire detection to produce accurate result. Covariance method is for flame detection. This method use temporally extended covariance matrices representing all the information together. The method works only well when the fire is clearly visible. If the fire is small and if it is far away from the camera or covered by dense smoke the method fails. Wavelet and Color model combined together and detect smoke earlier. Neural Network produces accurate result as it uses temperature, smoke density and CO concentration. By these approaches we cannot completely protect the forest from fire but we reduce the level of damage. Perception Neural Network along with Multi Threshold algorithm classified image pixels of cloud, land, smoke, and background and produced accurate result of smoke.

References

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