

EMERGING METHOD FOR EARLY DETECTION OF FOREST FIRE

LITERATURE SURVEY

- 1. Surapong Surit, Watchara Chatwiriya** 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.
- 2. P. Piccinini, S. Calderara, and R. Cucchiara** proposed a method based on the wavelet model and a color model of the smoke. The proposed method exploits two features: the variation of energy in wavelet model and a color model of the smoke. Smoke is detected based on the decrease of energy ratio in wavelet domain between background and current. The deviation of the current pixel color is measured by the color model. Bayesian classifier is used to combine these two features to detect smoke.
- 3. R. Gonzalez** proposed a method to detect fire based on Wavelet Transform. Stationary Wavelet Transform is used to detect Region of Interest. This method involves three steps preprocessing, SWT, histogram analysis. In preprocessing unwanted distortions are removed and image is resized and transformation of resized image is performed. High frequencies of an image are eliminated using SWT and the reconstruction of image is done by inverse SWT. Image indexation is performed to group the intensity colors that are closed to each other. Histogram analysis is used to determine the various levels of indexation. After analysis a comparison is made with non-smoke frame and non-smoke images are eliminated. These three are combined and fire is detected.
- 4. Osman Gunay and Habiboglu** proposed a system based on Covariance Descriptors, Color Models, and SVM Classifier. This system uses video data. Spatio-temporal Covariance Matrix (2011) [13] 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.

5. **Dimitropoulos (2015)** proposed an algorithm where a computer vision approach for fire-flame detection is used to detect fire at an early stage. Initially, background subtraction and color analysis is used to define candidate fire regions in a frame and this approach is a non-parametric model. Following this, the fire behavior is modeled by employing various Spatio-temporal features such as color probability, flickering, spatial and spatiotemporal energy. After flame modeling the dynamic texture analysis is applied in each candidate .
6. **Histogram and Mediods.** LDS is used to increase the robustness of the algorithm by analyzing temporal evolution of pixel intensities. Pre-processing is done after this to filter non-candidate regions. Spatio-temporal analysis is done to increase the reliability of the algorithm. The consistency of each candidate fire region is estimated to determine the existence of fire in neighboring blocks from the current and previous video frames. Finally, a two-class SVM classifier is used to classify the fire and no fire regions.
7. **Hamed Adab** proposed another system which is based on Indexing. GIS techniques and remote sensing [10] provides further assistance. The indexing may be structural fire index, Fire risk index, Hybrid fire index. Depending on the geographical condition of the area the indexing differs. Validations of indices are based on hot spot data. Structural fire indices show static information and it does not change over short time span and used to predict the risk in advance. Fire risk index changes as the vegetation or climate changes. Hybrid index is a combination of Structure and Fire index. The disadvantage of this indexing is that way of combining.
8. **Celik (2007)** proposed a generic model for fire and smoke detection without the use of sensors [15]. Fuzzy based approach is used in this system. Color models such as YCbCr, HSV are used for fire and smoke detection. The fire is detected using YCbCr color model samples because it distinguishes luminance and chrominance. Y, Cb, Cr color channels are separated from RGB input image. A pixel is more likely a fire pixel if intensity of Y channel is greater than channel Cb and Cr.

9. Paulo Vinicius Koerich Borges proposed a fire detection method based on probabilistic method and classification. Computer vision based approach is used in this approach. Though this approach is used surveillance it is also used to automatic video classification for retrieval of fire catastrophes in databases of newscast content. There are large variations in fire and background characteristics depending on the video instance. The proposed method observes the frame-to-frame changes of low-level features describing potential fire regions. These features include color, area size, surface coarseness, boundary roughness, and skewness within estimated fire regions.

10. Bayes classifier is used for fire recognition. In addition, apriori knowledge of fire events captured in videos is used to significantly improve the results. The fire region is usually located in image produce satisfying result we now go for fire detection to produce accurate result. Wavelet based smoke detection is used for smoke detection in video sequences of outdoor environment. 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. Fuzzy based approach uses YCbCr and HSV model and detects fire at an early stage.