

LITERATURE SURVEY

Celik (2007) proposed a generic model for fire and smoke detection without the use of sensors. 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**. In the above image set, the pixel is fire pixel as the intensity of Y channel is greater than Cb and Cr channel. HSV color model is used for Smoke detection as it does not show chrominance characteristics as fire. As smoke is the early indicator of fire it should be detected at lower temperature, here its color varies from white-bluish to white, the saturation is low which satisfies the HSV color model property. As like smoke, sky also has grayish color property and it may be identified as smoke. This problem is rectified by Motion Property, where sky will be removed.

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. 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 the center of each frame. This fact is used to model the probability of occurrence of fire.

Zhanqing proposed another method using NN and Multi-threshold algorithm. In this method the NN not only classify the smoke, sky, background but also generates a continuous random output representing mixture of these. NN consumes time in case of large areas so multi-threshold algorithm also used as well. These two approaches may be combined or used separately depending on the size of the area. Multilayer Perceptron Neural Network is used here. The number of neurons in the output layer is equal to the number of desired parameters of the output vector, which are “smoke,” “sky,” and “background”. The degree of separation between pixels is identified by Euclidean Distance. Multi threshold algorithm is based on channel wise approach, reflectance of each channel value is used for threshold assumption and is applied to each and every pixels of the image, smoke pixels are marked and false pixels are removed. Threshold value is set as **$0.9 \leq \text{channel 1 reflectance} / \text{channel 2 reflectance} \leq 1.5$** . Pixels which reach this threshold are smoke pixels else are false pixels and are removed.