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Estimation and Detection of Fire Flow by SVM Classifier

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Abstract-- In the past decennary computational vision based flame detection has focused significantly with a camera surveillance system omnipresent, whereas many penetrative features such as colour, shape, texture, etc., have been employed in the literature. This paper proposed a motion detection of motion features, the variation of the flow on fire motion in turbulent, fast, struction and rigid motion of the object. The fire motion is not characterized by the classical optical flow methods. optical mass transport model and data driven optical flow scheme are the two methods used to detect dynamic texture and saturated flame in the the fire detection task combined with EM segmentation image classification process for accuracy of the result. The proposed system we use support vector machine instead of neural network influences.

Keywords—fire detection, SVM Classifier, optical flow, EM segmentation.

I. INTRODUCTION

Detecting the flame in large area is vital ant to prevent the cause of fire damage. The indoor section heat smokings particles are detected by the hardware sensors. The serious issues are to find the flame in an outdoor section. This paper presents the video detection approach where the hardware sensor may fail. In addition to covering a wide viewing range, video cameras capture data from which additional information can be extracted; for example, the precise location, extent, and rate of growth. Surveillance cameras have recently become pervasive, installed by governments and businesses for applications like license-plate recognition and robbery deterrence. Reliable vision-based fire detection can feasibly take advantage of the existing infrastructure and significantly contribute to public safety with little additional cost.

The video based detection having three steps. (1)Preprocessing (2) Feature Extraction (2) Classification Algorithm. In the first step (1) preprocessing is focused on the hardware devices to do the preliminary operations (2) Feature extraction having to extracting the variable features and eliminate the unwanted areas and (3) Classification algorithm is used to decision regarding process such as Support vector machine (SVM) classifier. [8] First, since classical optical flow methods are based on assumptions, e.g., intensity and flow smoothness, which are not met by fire motion. [8] derived two optical flow estimators; optical mass transport and non smooth data flow model designed for detecting with and without the dynamic texture of flames then we added the EM segmentation segmentation uses the EM algorithm to estimate the parameters of a mixture of Gaussians model of the joint distribution of pixel color and texture features.

II. ESTIMATION OF FIRE FLOW

We present in the [] two novel optical flow estimation optical mass transport (OMT) and non smooth data (NSD) that are specifically designed for the fire detection and we proposed with the combination of EM segmentation for the higher performance result.

A. Optimal mass transport

In optimal mass transport based on the physical attribute is that fire and smoke tends to conservative intensity taken as a generalized mass and move the mass in an optimal way. The optimal mass transport model show the differential intensity of pixels during smoke and other similarly coloured background. The spatially and temporally intensity constancy change of intensity occurs in the burning process due to fast pressure and heat dynamics. Smoothness regularization may be counter-productive to the estimation of fire motion, which is expected to have a turbulent, i.e., non-smooth, motion field. For these reasons, an optical flow estimation modeling fire as a dynamic texture.

B. Non smooth data flow

The OMT (Optimal Mass Transport) model used only for the saturated fire blobs with dynamic texture but it having some boundary conditions that will be estimated by Non smooth data flow (NSD). It does not enforce the smoothness only regularize the flow magnitude. The NSD is explicitly chosen to be non-smooth since saturated fire blobs are expected to have non-smooth boundary motion.

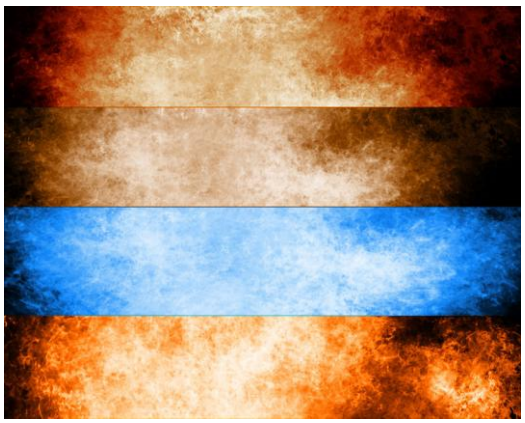

Fig 1.differentiating the flame by generalized mass

C. EM Segmentation

Expectation-Maximization algorithm [7] is used for many estimation problems in statistics. We need to estimate two things (1) parameters (slope and intercept) (2) assignment of each data point which can be generated.
This gives the basic structure of an EM algorithm:

1. Start with random parameter values for the two models.
2. Iterate until parameter values converge:

E step: assign points to the model that _ts it best.
M step: update the parameters of the models using only points assigned to it.

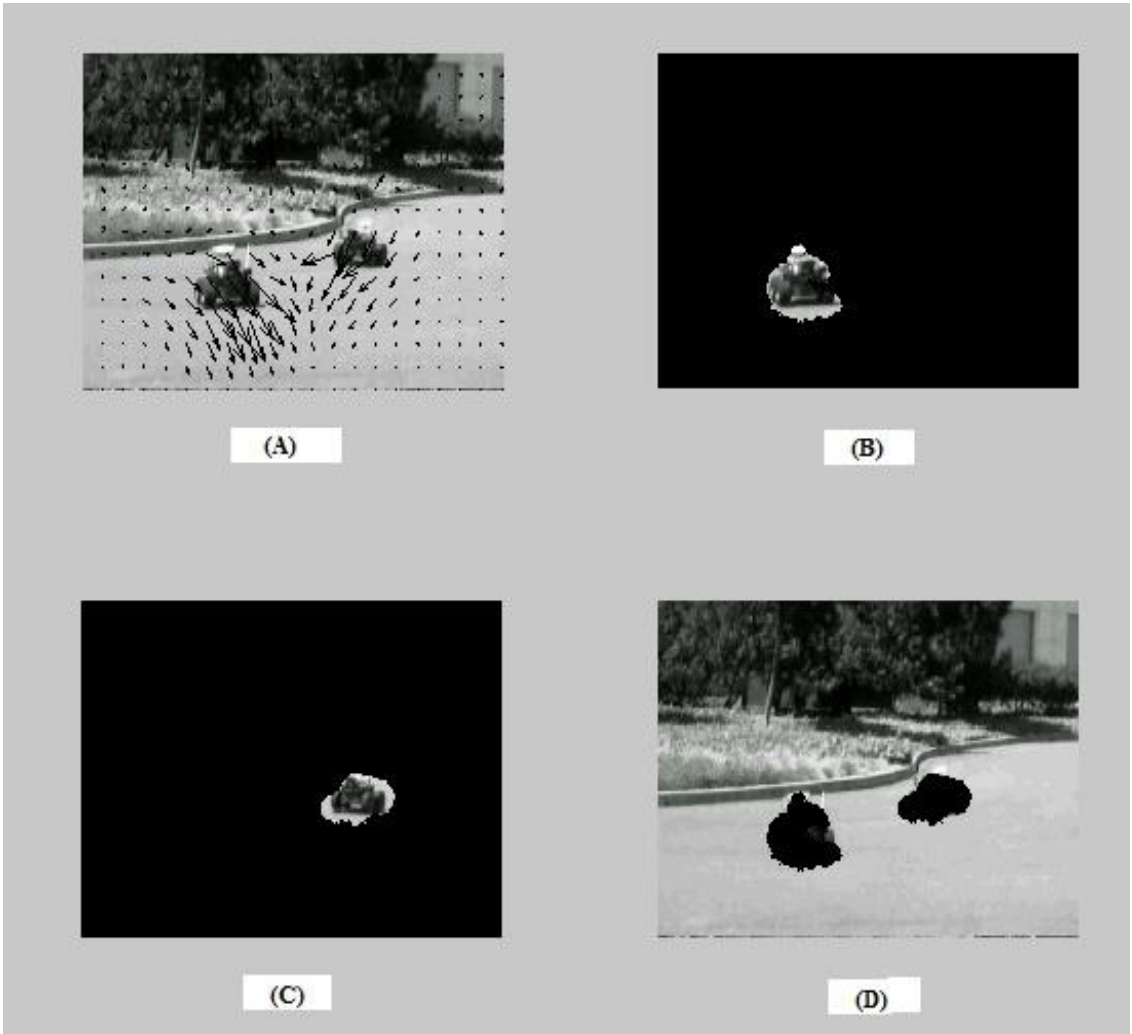

Fig 2. (A) Optical flow (B) & (c) & (D) Segmenting the images

In the above picture Fig 2 will Shown the optical flow and the segmentation of the individual things in that the images

III. DETECTION ALGORITHM

In this paper we proposed using [4] Support Vector Machine (SVM) classifier algorithm to detect the features of fire region.SVM in one of the well known method for pattern classification and image classification. It is designed to separate the set of training images into two different classes, dimensional feature space, and the class label, SVM builds the optimal separating hyper planes based on a kernel function. All images of which feature vector lies on one side of the hyper plane.

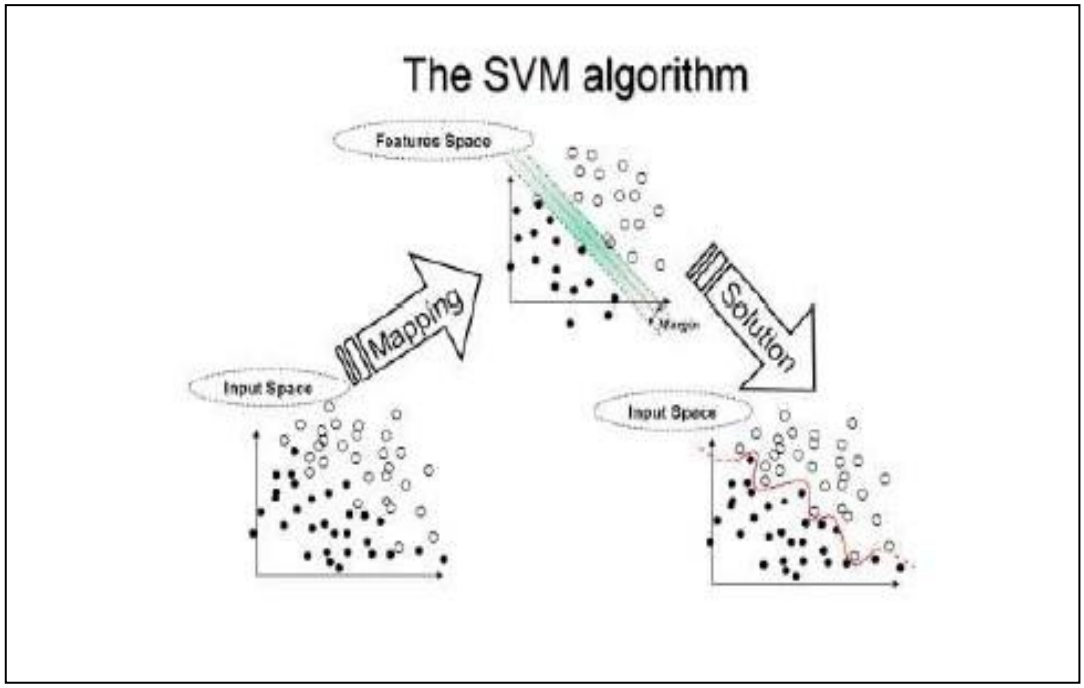

Fig 3. SVM Algorithm

In the above image shown how SVM algorithm separating the clusters of vector in such a way that cases with one category of the target variable are on one side of the plane and cases with the other category are on the other size of the plane.

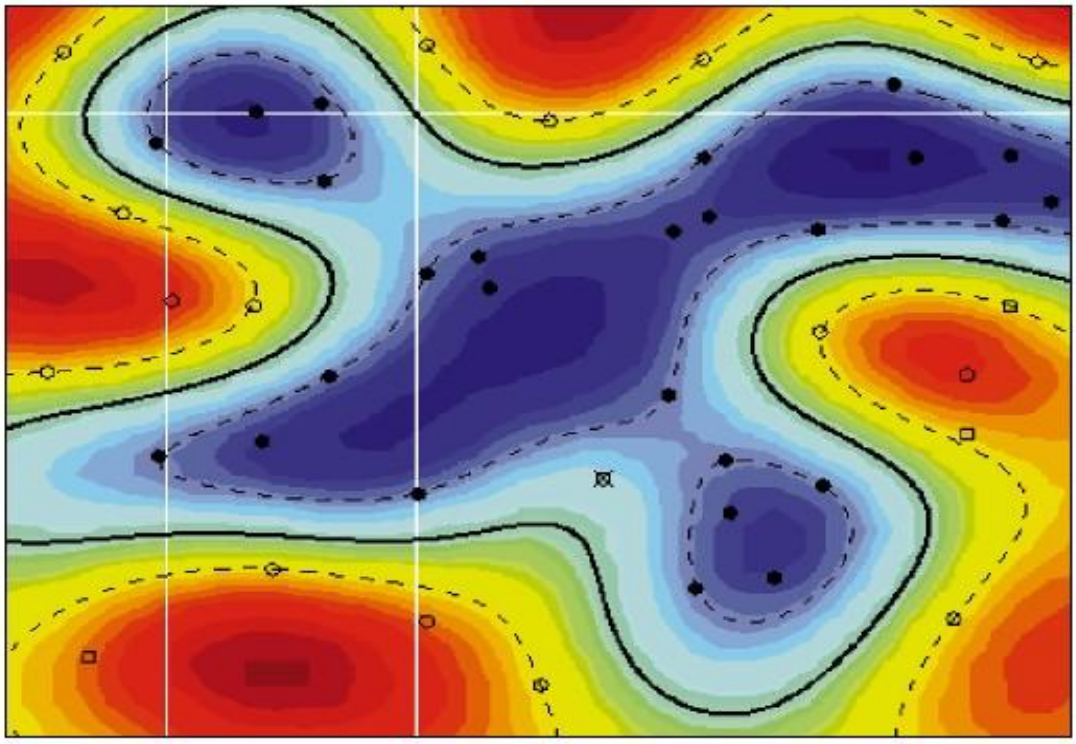

Fig 4. Kernel Functions performed in complex boundaries

IV. PROCESSING FUNCTIONS IN FIRE DETECTION TASK

The various process performed in the fire flow detection task ant it will shown at the Fig 5

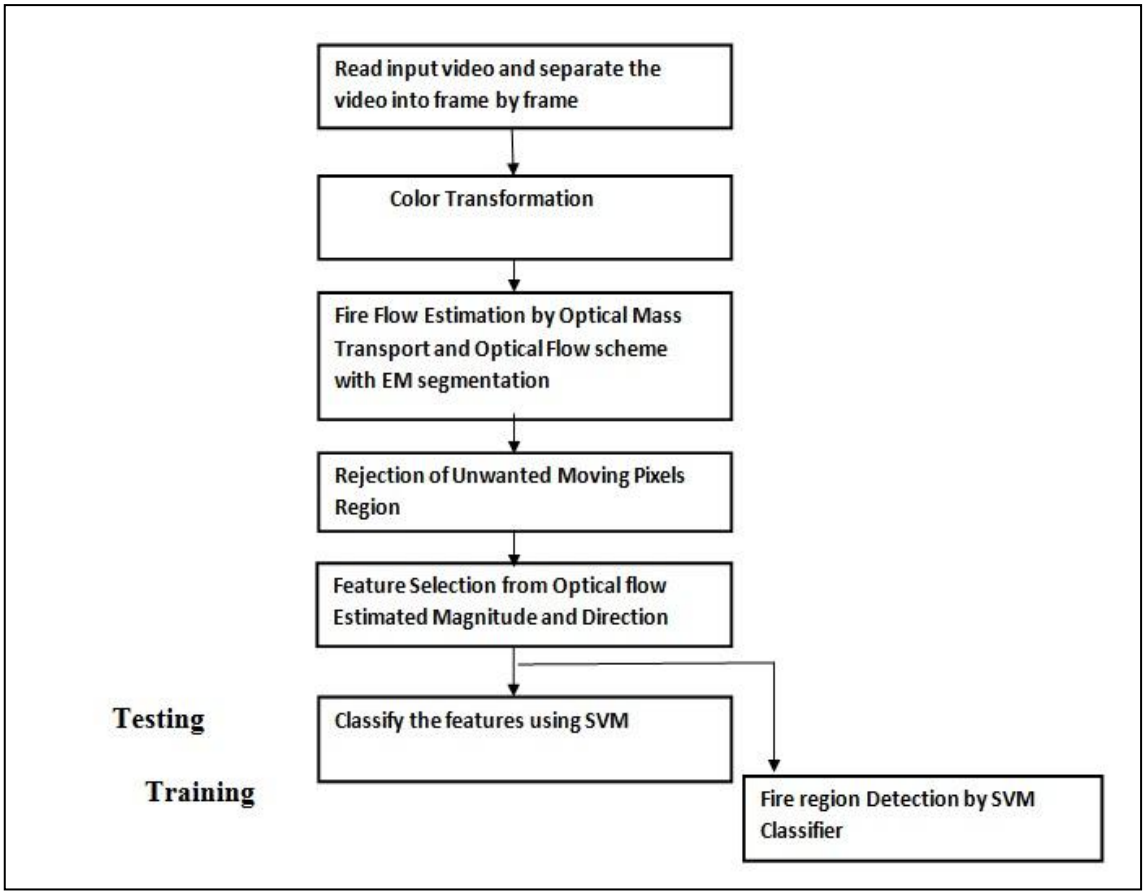

Fig 5. Levels of fire detection task

V. CONCLUSIONS

The two estimators are used to detect the fire flow and it may having chance of false detection hence, we combine the EM (expectation-Maximization) algorithm with the optimal flow estimators for better results and the support vector machine classifier (SVM) used for the image classification process by segmenting the optimal clusters on the hyper plane.SVM training seem to be more robustness compared with the Artificial neural network (ANN).

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