ADAPTIVE ROBUST TECHNIQUES FOR BACKGROUND SUBTRACTION USING CLUSTERING ALGORITHM

CHAITHANYA NASKANTI
chaithanyanaskanti@gmail.com
M.TECH

MRS. SUWARNA GOTHANE
gothane.suvarna@gmail.com
ASSOCIATE PROFESSOR

CMRTC, MEDCHAL, HYDERABAD

Abstract:
Background subtraction is essential part of video analysis. Video analysis includes background model followed by a regularization scheme. A model of the background allows it to be distinguished up on a per-pixel basis from the foreground with original image, while the regularization combines information from adjacent pixels within the image. In this paper we present a new method based on k-means Algorithm to find out the objects, which are used to estimate per-pixel background distribution with the foreground.

Backend image: Which is already stored whenever we start the camera? Foreground image: Which are captured by the webcam and these are compared with the background image to get the status. K-Means produce tighter clusters than hierarchical clustering, especially if the clusters are globular. K-means is good performance compared to remaining.

Index Terms: Background Subtraction, K-means.

Introduction:
Background Subtraction [3] with K-means clustering algorithm which is useful to provide security where it is necessary. Video police investigation systems have long been in use to observe security sensitive areas. The creating of video police investigation systems “smart” needs quick, reliable and study algorithms for object detection, classification, and Clustering, chase and activity analysis. Background subtraction is to find the object detection which is the basic step for more analysis of video. It handles segmentation of moving objects from stationary background objects. Object classification step categorizes detected objects into pre-defined categories like human, vehicle, animal, clutter, etc. It’s necessary to differentiate objects from one another so as to trace and examine their actions dependably.

In the previous strategies background subtraction [3] is used to conduct only for static images. For this a pixel wise background modeling and subtraction technique using multiple features is proposed. Hence, in this colour, gradient and Haar-Like features are integrated to handle the variations in each pixel.

K-means is one in every of the simplest unsupervised learning algorithms that solve the well illustrious clump drawback. The procedure follows an easy and straightforward and easy means to classify a given knowledge set through a precise range of clusters (assume k clusters) mounted a priori. The main plan is to outline k centers, one for every cluster. These centers ought to be placed in an exceedingly crafty means as a result of totally different completely different location causes different result. So, the higher alternative is to place them as very much like doable secluded from one another.

2. Related Work

Giving the images as inputs which are captured by the web camera applied SVM algorithm [1]. In existing we have used SVM algorithm. Support vector machines is originally designed for binary classification by comparing the background & foreground image.
The way to effectively extend concept for multiclass classification remains associate in progress analysis issue [2]. Many ways are planned while constructing a multiclass classifier by combining many binary classifiers. Some authors jointly planned ways that think about all categories right away because it is computationally costlier to unravel multiclass issues, comparisons of those ways victimization large-scale issues haven’t been seriously conducted. particularly for ways determination multiclass SVM in one step, a way larger optimization downside is needed therefore up to currently experiments area unit restricted to tiny information sets. But It does not produce the accurate results.

A general trainable framework for object detection in static images of cluttered scenes [3] where detection technique develop is based on a wavelet representation of an object class derived from a statistical analysis of the class instances. By learning an object class in terms of a subset of an over complete dictionary of wavelet basis functions, a compact representation of an object class which is used as an input to a support vector machine classifier is derived.

Background maintenance, though frequently used for video surveillance applications, is often implemented adhoc with little thought given to the formulation of realistic, yet useful goals [4]. Wallflower, a system that attempts to solve many of the common problems with background maintenance.

A technique is proposed for the modeling of dynamic scenes for the purpose of background foreground differentiation and change detection. The method relies on the utilization of optical flow as a feature for change detection. In order to properly utilize the uncertainties in the features, novel kernel based multi variety density estimation [4] technique is proposed that adapts the bandwidth according the uncertainties in the test and sample measurements.

Principled and general method for face recognition with contiguous occlusion is proposed. Not assuming any explicit prior knowledge about the location, size, shape, color, or number of the occluded regions; the only prior information about the occlusion is that the corrupted pixels are likely to be adjacent to each other in the image plane.

3. Methodology

3.1 Proposed System

- In proposed system we are presenting Background Subtraction with k-means algorithm which is used for efficient object detection.
- In proposed system we are using K-means algorithm
- In proposed system we are taking video as input.

Advantages

- Very efficient
- Low memory management
- Less power consumption
- Low maintenance

3.2 Algorithm

K-means algorithm could be a technique of cluster analysis that aims to partition n observations into k clusters during which every observation belongs to the cluster with the closest mean. This results into a partitioning of the information area into Voronoi cells. “K” stands for number of clusters, it is a user input to the algorithm. From a set of data points or observations (all numerical), K-means attempts to classify them into K clusters.

\[ W(C) = \frac{1}{2} \sum_{k=1}^{K} \sum_{C(i)=k} \| x_j - m_k \|^2 = \sum_{k=1}^{K} N_k \sum_{C(j)=k} \| x_i - m_k \|^2 \]
• $X_1, \ldots, X_N$ are data points or vectors or observations
• Each observation will be assigned to one and only one cluster
• $C(i)$ denotes cluster number for the $i^{th}$ observation
• Dissimilarity measure: Euclidean distance metric
• $K$-means minimizes within-cluster point scatter:

$$\text{where}$$

- $m_k$ is the mean vector of the $k^{th}$ cluster
- $N_k$ is the number of observations in $k^{th}$ cluster

### 3.3 System Architecture

![Fig: Background Subtraction](image)

#### 4 Modules

- **Video Capturing**
- **Moving Object Detection**
- **Motion Segmentation**
- **SMS Alert System**

#### 1. Video capturing:

Video Capturing refers to the capturing, manipulation, and storage of moving images that can be displaced on computer screens. First, a camera capture the video session and send analog signals to a video-capture adapter board. In this module we are JMF software which is used to taking the video as an input and convert the video into frames.

#### 2. Moving object detection:

In an static or dynamic areas the objects will be able to move in any direction, and with a camera will setup typical of surveillance systems, this will give movement in all directions of the surveillance video, and objects will enter and leave the field of view on all its boundaries. Furthermore the video will show some perspective, i.e. the size of an object will change when it moves towards or away from the camera. The objects’ freedom of movement also implies that they can move in a way where they occlude each other, or they may stop moving for a while. In the case of people the occlusion and stopping will be very likely when they are interacting, e.g. two people stopping and talking to each other and then shaking hands or hugging before departure. People may also be moving in groups or form and leave groups in an arbitrary fashion. These challenges could be solved by restricting the movement of the objects, but this would limit the system from being applied in many situations.
Different types of objects: In some open areas many different types of objects will be present. A surveillance video of a parking lot for example will contain vehicles, persons, and maybe birds or dogs. People may also leave or pick up other objects in the scene. The most general surveillance system would be able to distinguish between these objects, and treat them in the way most appropriate to that type of object. Constraints in this respect would limit the system to areas with only a certain type of objects.

3. Motion segmentation:
Background subtraction is the first step in the process of segmenting and tracking people. Distinguishing between foreground and background in a very dynamic and unconstrained outdoor environment over several hours is a challenging task. The background model is kept in the data storage and four individual modules do training of the model, updating of the model, foreground/background classification and post processing.

The first k video frames are used to train the background model to achieve a model that represents the variation in the background during this period. The following frames (from k + 1 and onwards) are each processed by the background subtraction module to produce a mask that describes the foreground regions identified by comparing the incoming frame with the background model. Information from frames k + 1 and onwards are used to update the background model either by the continuous update mechanism, the layered Updating, or both. The mask obtained from the background subtraction is processed further in the post processing module, which minimizes the effect of noise in the mask.

4. SMS Alert System (Short Message Service):
After detecting the changes in video frames, we are alerting the central control unit or the user through SMS using the GSM Modem.

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem
sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

5 Conclusions & Future Work

We presented a new background subtraction method and validated its effectiveness with extensive testing. The method is based on an existing model, namely DP-GMMs, but with new model learning algorithms developed to make it both suitable for background modeling, and computationally scalable. Specifically, our model is able to learn the number of mixture components more accurately and hence better cope with a variety of scene changes in comparison with the existing more heuristic methods. It initiates the user by sending the SMS to their mobile. It also proves itself to have a good performance in many other areas, particularly on dealing with heavy noise.

Reference:


