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An Approach for Visual Tracking Using Background Subtraction

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ABSTRACT
Security is the degree of resistance to, or protection from, harm. It applies to any vulnerable and valuable asset, such as a person, dwelling, community, nation, or organization Everywhere in every field we need to be secure or provide security so as to avoid any major losses. This project is based on security that is used to monitor the moving objects and store the images then sending a message to the owner on his/her mobile phone. For this we are making use of BACKGROUND SUBTRACTION METHOD. Background subtraction is a widely used approach for detecting moving objects from static cameras. Background subtraction is the process of separating out foreground objects from the background in a sequence of image frames.
Keywords: - Background Subtraction Algorithm, Kernel Density Approximation, Support Vector Machine

I. INTRODUCTION

Security can be implemented in many ways, sometimes audio, video or by any other means. Video surveillance systems are most common today. Video surveillance takes place normally by using CCTV cameras (Closed Circuit Television) for monitoring or surveillance for intruder detection in case of emergencies in hospitals, shopping malls, banking sectors, personal purpose automation and so on. Later video fusion approach also used for monitoring such systems. These systems are designed in such a way that monitoring images are stored and there is a need for human to interact for knowing about the changes in the current surveillance systems and then they will intimate to the concerned organization. Hence this is not a fast secured monitored due to the time delay taken for human interaction. Due to time delay, we cannot get the update N information for every minute or second and so it is not possible to detect the intruder in an appropriate time. These systems use the moving average algorithm to store the monitored images. Also this system lack the computation capability for surveillance meant for security.

Disadvantages of Existing System are

- Highly hardware cost so cost effective and less secure.
- Needs human interaction for monitoring.
- Lacks computation capability while monitoring.
- Does not keep track of previous surveillance operations.
- So most surveillance systems use static cameras which make the object detection much more easy .In such cases a background model is trained with data obtained from empty scenes and foreground regions are identified using the dissimilarity between the trained model and new observations.

Background subtraction is a widely used approach for detecting moving objects from static cameras. Fundamental logic for detecting moving objects from the difference between the current frame and a reference frame, called “background image” and this method is known as FRAME DIFFERENCE METHOD. Challenges are associated with background modelling. Dynamic backgrounds. Gradual illumination changes, sudden illumination changes, Shadows another challenge is that many moving foregrounds can appear simultaneously with the above non-static problems.

When the background is modelled with probability density functions, background probabilities between features may be inconsistent due to illumination changes in light, foreground objects similar in features to the background and shadows of images. For this purpose we use a Support Vector Machine (SVM) which mitigates the inconsistency and the correlation problem among different features. This algorithm works as three different phases, in first

phase multiple features are integrated. In the second phase one dimensional density estimation by KDA is done efficiently and finally SVM classifies foreground/background. These phases are strongly coordinated to improve background subtraction performance.

II. RELATED WORK

1. Adaptive Background Mixture Model

A common method for real-time segmentation of moving regions in image sequences involves background subtraction", or thresholding the error between an estimate of the image without moving objects and the current image. The numerous approaches to this problem differ in the type of background model used and the procedure used to update the model. This paper discusses modelling each pixel as a mixture of Gaussians and using an on-line approximation to update the model Gaussian distribution which represents it most effectively is considered part of the background model.

This significantly reduces additional computational burdens. Shadow detection need only be performed upon pixels labelled as foreground and therefore with negligible computational overheads the moving shadows can be detected successful This results in a stable, real-time outdoor tracker which reliably deals with lighting changes, repetitive motions from clutter, and long-term scene changes. This system has been run almost continuously for 16 months, 24 hours a day, through rain and snow

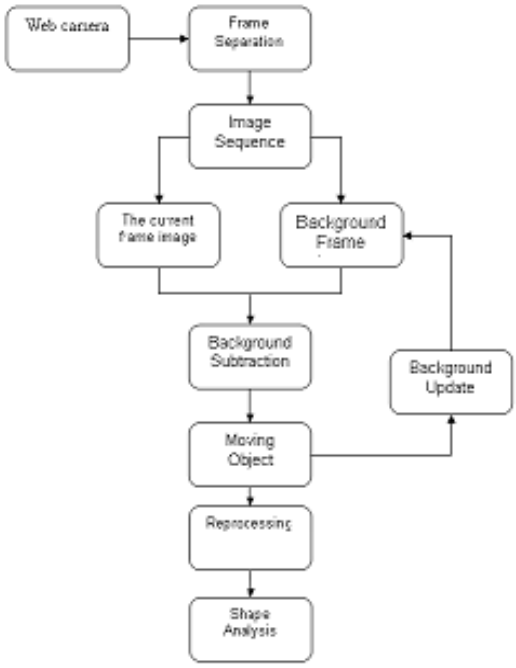
Review of the most relevant background subtraction methods is presented. This original review allows the readers to compare the methods' complexity with respect to its speed, accuracy and memory requirements. It can also effectively guide them to select the best method for a specific application in a disciplined way.

2. Managing electric circuit Television

In recent years within the use of electric circuit TV (CCTV) as a tool in handling crimes in public places. Several non-public firms and variety of authorities have initiated trials within the use of CCTV and also the technology is additionally getting used in a very range of how within the conveyance system. As a result of CCTV is comparatively new, it\'s still not clear however effective it\'s in deterring or reducing crime.

Police investigation, or there is also a shift to different types of crime that are less prone to CCTV police investigation. For these reasons, CCTV on its own will do very little to handle future crime interference. This system uses the moving Average algorithm to store the monitored images. Also this system lack the computation capability for Surveillance meant for security.

Architecture:



III. SYSTEM OVERVIEW

Proposed System

Here K-means and Canny Edge Detection combined. An IVS system provides a low-cost intelligent mobile phone-based video surveillance solution using moving object recognition technology. The basic principle of moving object detecting is given by the Background Subtraction algorithm. Then, a self-adaptive background model that can update automatically and timely to adapt to the slow and slight changes of natural environment is detailed. When the subtraction of the current captured image

and the background reaches a certain threshold. A moving object is considered to be in the current view and the mobile phone will automatically notify the central control unit or the user through SMS. Low maintenance cost and occupies less storage and memory.

IV. IMPLEMENTATION

Feature Analysis: Feature scope is that to reduce the amount of resources required to describe a large set of data accurately and cost should be reduced. When performing one of the major problems of analysis of complex data is the number of variables involved. Analysis with a large number of variables generally requires a large amount of memory and computation power or a classification algorithm. We describe the characteristics of individual features and the performance of multiple feature integration.

The correlation between every pair of features. RGB colors and three Harr-like features are significantly correlated. We propose a pixel wise background modeling and subtraction technique using k-mean clustering algorithm. Where generative and discriminative techniques are combined for classification. The features improve background classification performance. In pattern recognition and in image processing, feature extraction is a special form of dimensionality reduction.

Classification: After background modeling, each pixel is associated with k 1D Gaussian mixtures, where k is the number of features integrated. Background/foreground classification for a new frame is performed using these distributions. The background probability of a feature value is computed, and k probability values are obtained from each pixel, which are represented by a k-dimensional vector. Such k-dimensional vectors are collected from annotated foreground and background pixels, and we denote them by yj (j ¼ 1; . . .;N), where N is the number of data points. In most density-based background subtraction algorithms, the probabilities associated with each pixel are combined in a straightforward way, either by computing the average probability or by voting for the classification. The objective of color clustering is to divide a color set into c homogeneous color clusters. Color clustering is used in a variety of applications, such as color image segmentation and recognition. This algorithm classifies a set of data points X into c. Homogeneous groups represented as fuzzy sets F1, F2, ..., Fc. The objective is to obtain the fuzzy c-partition F = {F1, F2, .., Fc} for both an unlabeled data set X = {x1, ..., xn}. Fuzzy c-means algorithm for clustering color data is proposed in the present study. The initial cluster centroids are selected based on the notion that dominant colors in a given color set are unlikely to belong to the same cluster.

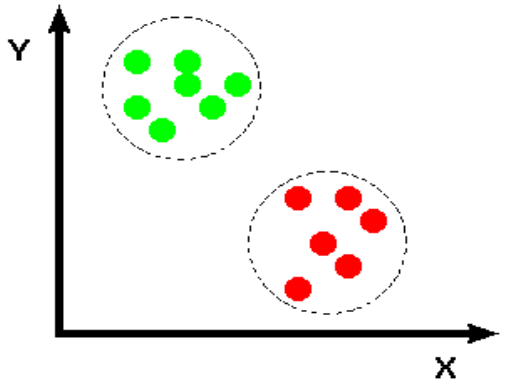


Fig: Classification

Background Detection: K-means clustering is a method of cluster analysis which aims to partition observations into k clusters in which each observation belongs to the cluster with the nearest mean. The problem is computationally difficult; however there are efficient heuristic algorithms that are commonly employed that converge fast to a local optimum. These are usually similar to the expectation-maximization algorithm for mixtures of Gaussian distributions via an iterative refinement approach employed by both algorithms. Additionally, they both use cluster centers to model the data, however k-means clustering tends to find clusters of comparable spatial extend, while the expectation-

maximization mechanism allows clusters to have different shapes. After the background template has been constructed, the background image can be subtracted from the observed image. The result is foreground (moving objects). Actually, the background is timely updated.

K-means minimizes within-cluster point scatter:

$$W(C)=\frac{1}{2}\sum_{k=1}^{K}\sum_{C(i)=k}\sum_{C(j)=k}\left\|x_i-x_j\right\|^2=\sum_{k=1}^{K}N_k\sum_{C(i)=k}\left\|x_i-m_k\right\|^2$$

Where

m_k is the mean vector of the k^{th} cluster.

N_k is the number of observations in k^{th} cluster.

Alerting System: 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. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS messages.

GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. This alert message is coded in server code .this will pass the small message like ”Intruder Found”. After receiving the text message the owner can view the detected image by using GPRS supported mobile using. This entire application was deployed in web logic server so it will give response to client requests.

SCREEN SHOTS

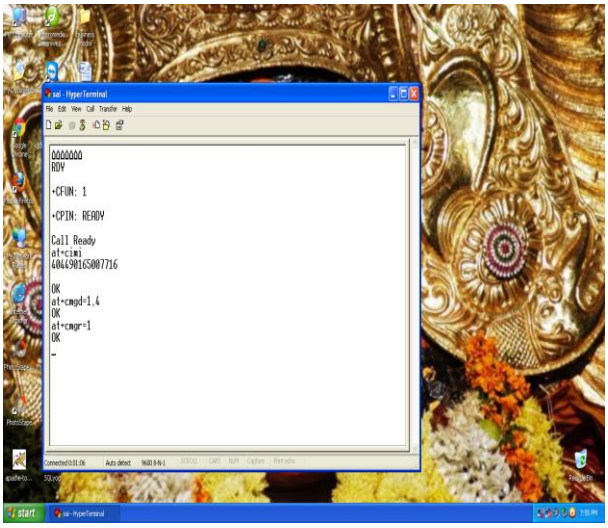


Fig: This Hyper Terminal is used to check whether GMS modem is working are not

***Hyper Terminal**: This hyper terminal is used to check whether GMS modem is working are not. If it is working it gives you the text as ok.*

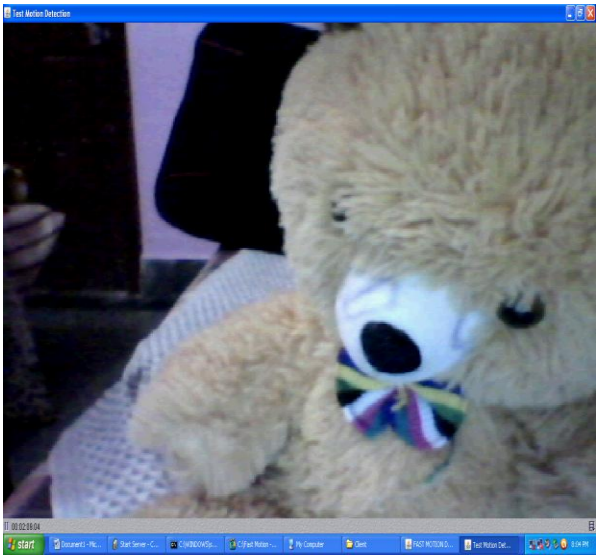


Fig: Test Motion Detection is used for capturing images

Test Motion Detection: This is used when cam is started Test motion detection window is displayed and we click on the start cam on the window the images can be captured.

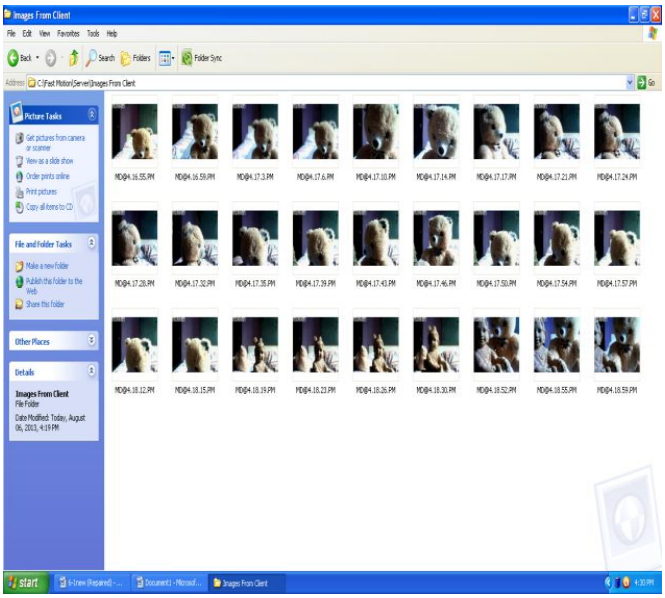


Fig: when server side server is running the captured images

When server side server is running the captured images the images are captured continuously from the client to the server when the changes are present from the current image

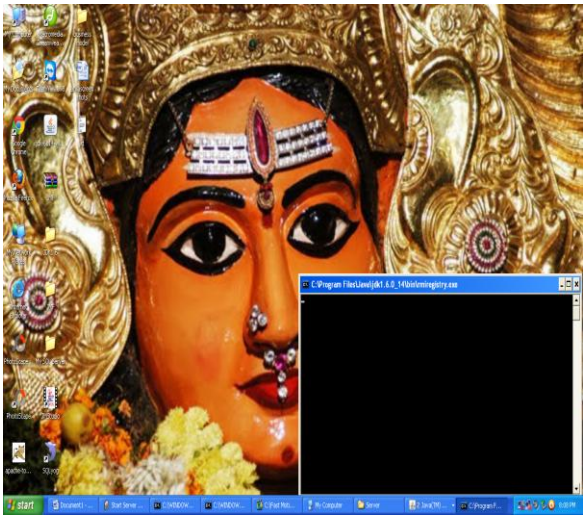


Fig: when server side server is running for comparing images

The server side server is running for comparing images with the current image.

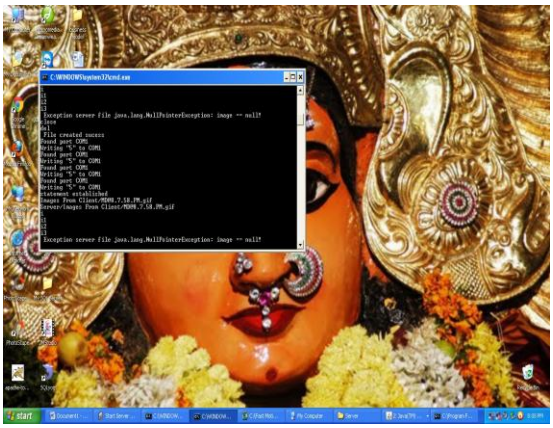


Fig: This shows that we get message to mobile through GSM modem

Alerting System: 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. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS messages.

Captured Images in the System:

The images can also be viewed in the System also by entering the ip address and local host in the browser we can view the images

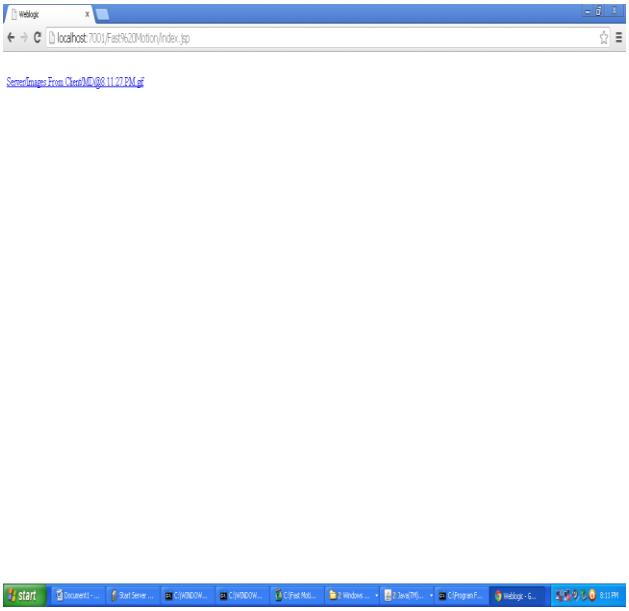


Fig: By giving ip address and local host images can be viewed at any place

V. CONCLUSION

The Background subtraction method we can capture the images which are moving. This application is used in security places where it is needed. It is less expensive. In this application we are using GSM modem to get the alert message when any object is found.

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