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Tracking Learning and Detection of Multiple Objects using Static Camera

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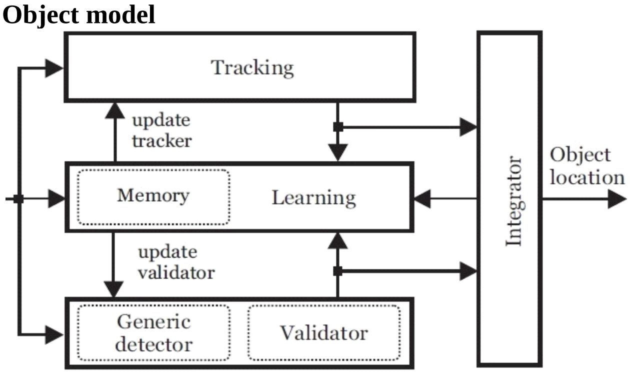
Abstract- **Proposed system performs tracking, learning and detection of multiple objects in the video stream using a static camera. Proposed system does the tracking of multiple objects in presence of occlusion, clutter, scaling and rotation. There were many tracking approaches have been proposed in the past decades such as histogram based mean shit methods, contour based tracking methods but they were intensive while achieving better tracking accuracy. Proposed System presents robust tracking framework that can be applied to real time applications. Propose system is expected to track and detect the real time object which is under constant rotation upto 180 degree.**

General Terms-**Extraction, matching template, tracking, detection.**
Keywords **motion detection, improved tracking camshift method, real time object learning.**

INTRODUCTION

To track moving objects is a key ability for different agents to fulfill many different tasks like surveillance, guiding or following as well as interacting with and learning from humans. Many successful and accurate object tracking approaches have been proposed in recent years. However, many of them are not applicable for the tasks of moving objects, because the domain violates several of the underlying assumptions. There is no static background and no fixed target appearance and the image quality can be bad due to insufficient illumination or glare. In some applications one cannot build a complex target model off-line, because the kind of object to track is not known in advance. The purpose of our project Understands objects in video data due to its enhanced automation in public security surveillance as well as in traffic control and pedestrian flow analysis. Here, a system is presented ,This is able to detect and classify people and vehicles outdoors in different weather conditions using a static camera.

Object model



PROBLEM DEFINITION

The main focus of our application is survelliance,A recent survey done by the traffic as well as security agency assert that crimes and chaos take place where crowd are there in huge volumes ,thus to keep a track of all the moving as well detect and identify a security sytem that includes learning detection and tracking of object is developed. Existing system has the problems when object changes its appearances or object is moving out of camera view and again coming in front of camera. Tracking fails due to scaling, rotation, illumination changes and does not perform in case of full out of plane rotation. systems that were in use did not have full functionality regarding identification and tracking of humans as well as objects.These system also lacked tracking of moving objects which resulted in escape of criminals or culprits. Here it is recommended by professionals in the IT world to develop a system inclusive of all learning tracking and detection of objects using a static camera.

DEVELOPMENT IDEA

Camshift approach:

The Camshift algorithm ues histogram technique and iterative mean shift procedure on the back projected generated from new images to locate the image objects location, Camshift automatically adjust the object scale during tracking .A Calculation of the Back-projection Image and locating its center When tracking objects, CamShift uses HSV colour to present the colour distribution, the back projection image is generated from every new frame for processing. In order to reduce the computational consumption during tracking hue channel can be used in future.

Formula

$\sum qu = \sum_{i=1}^{n} \delta[c(xi)-u]$, (1)

Qn=summation d[c(xi)-u) (2)
I=1 A normalized method can be calculated as follow

Moo=summation Ibp(x.y)
$M00=\sum_x \sum_y Ibp(x,y)$ (3)

The first moment for x and y :
$M10=\sum_x \sum_y xIbp(x,y)$ $Mo1=\sum_x \sum_y yIbp(x,y)$ (4)

The centroid of search window:
$Xc=\frac{M10}{M00}$; $YC=\frac{M01}{M00}$ (5)

2) Analysis of Cam shift algorithm :

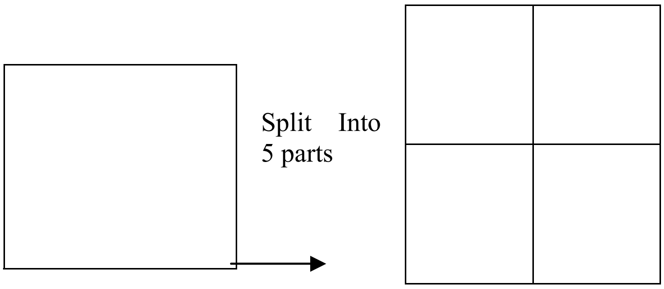
Based on the image projection Ibp,the process can be described as follows:

An initial local window w is used to find the new center location and set the search window to the oth moment. Repeat this procedure until an elliptical image can depict the object.

Although the cam shift method is very fast for processing images but it initiates execution from the initial position and converges to local maximum

A Iterative search

We first introduce a constraint that splits search method used by Adaptive local based search.



Algorithm : CamShift-Based Object Tracking Framework with ALS and Kalman Filter

Input: current frame I_t,the object window from last frame W_{t-1}, similarity threshold T

Output: the object window in the current frame W_t

1: calculate the back projection image.

2: Use the kalman filter to predict new location and l_{ext}

3: W_{tmp}=$A_{cs}(W_{t-1})$

4: calculate similarity P=$P_{cs}(W_{t-1})$

5: if p>T then

6: W_t=W_{tmp}

7: else

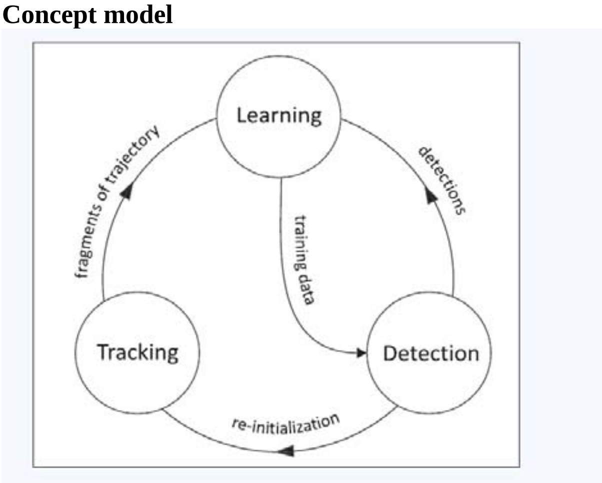
8: W_t=ALS ($W_{t-1,l_{ext}}$)

9: end if

10: update the kalman filter

11: return W_t

Concept model



SCOPE OF PROJECT

A wide range of possible applications for TLD technology has been identified .Potentially fruitful includes

Crime prevention Law enforcement agencies typically maintain large archieves of visual evidence, including past suspects, facial photographs and prints ,with this data integrated with our software , any recognized person from the data base is identified and detected the survelliance camera will detect and track him down.hiding of criminals from the system would be impossible .

Survelliance at Schools, malls

Schools , malls and crowded area are places where safety is the major concern.the software can be integrated with the camera at these places which can keep a track of the situation, it can also alert survelliance team during any mishap

Traffic signal are established to maintain law and order ,but many people break these laws by abolishing the traffic signal rules.The software can be integrated with a camera and can be established with the signals , the software will identify and track all the people breaking the signal.

PERFORMANCE PARAMETERS

Based on the matching strategy described above, two veryintuitive metrics can be defined.

(1) The multiple object tracking precision (MOPT):

$$\text{MOTP}= \sum i,t\, d\tfrac{i}{t} / \sum t, Ct \qquad (1)$$

It is the total error in estimated position for matched object-hypothesis pairs over all frames, averaged by the total number of matches made. It shows the ability of the tracker to estimate precise object positions.

(2) The multiple object tracking accuracy (MOTA):

$$\text{MOTA}= 1- \sum t\,(m_t + fpt + \text{mme}_t) \;/\; \sum t g_t \quad (2)$$

Where m_t , $\int pt$ and mme_t are the number of misses, of false positives, and of mismatches, respectively, for time t. The MOTA can be seen as derived from 3 error ratios:

$$\overline{m} = \sum t\ m_t / \sum t\ g_t \qquad (3)$$

the ratio of misses in the sequence, computed over the total number of objects present in all frames,

$$\overline{fp} = \sum t\ fpt / \sum t\ g_t \qquad (4)$$

Performance table

	FPS	α	Results
MOT P	20	25	65%
	27	28	75%
MOT A	30	40	45%
	27	30	60%

Table based on proposed system

MOT P= multiple object tracking precision

MOT A= multiple object tracking accuracy

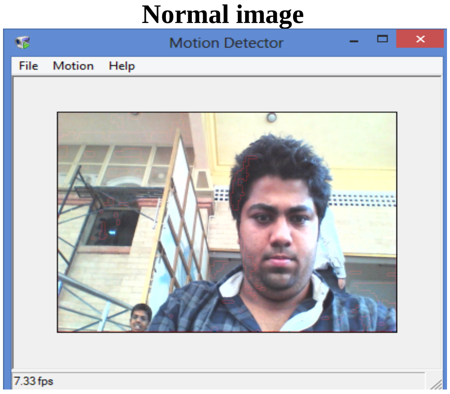
FPS = frames per sec

α= (threshold) tracking accuracy with respect to distance

EXPERIMENTAL RESULTS

We implement the motion detector in .net framework using c#. It detects the motion of the objects when the object is moving. We implement 4 motion detectors that detects different background ,foreground objects. It has 1 optimized detector for achieving the accuracy in detection.

Normal image



Foreground object detection image

DISCUSSION

In this project , we studied the problem of tracking of an unknown object in a video stream, where the object changes appearance frequently moves in and out of the camera view. We designed a new framework that decomposes the tasks into three components: tracking, learning, and detection. The learning component was analyzed in detail. We have demonstrated that an object detector can be trained from a single example and an unlabeled video stream using the following strategy: 1) evaluate the detector, 2) estimate its errors by a pair of experts, and 3) update the classifier. Each expert is focused on identification of particular type of the classifier error and is allowed to make errors itself.

CONCLUSION

The system which we are going to implement is based on tracking and identification of multiple real objects. improves the detection and classification of objects. The system can handle occlusions and has demonstrated good. results over multiple objects in varying conditions. In each and every case, the system accurately labeled the dynamic objects tracked them correct.

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