Object tracking using image processing

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***Abstract*- object tracking is a primary step for image processing application like object recognized, navigating systems and observation systems. The current image and the background image is differenced by nearer conforming in image processing. This paper takes insight into methods, their categorization into different types, and position of object on important and useful tracking methods. In this paper, we provide a brief overview of tracking techniques like region based, active contour based, etc with their good and bad aspects. Different tracking technology are mentioned with detailed view .we review general techniques under basic survey on different strategy and at last stating the detection of possible research guidance.**

***Index Terms*- object-tracking,image processing, technology, techniques ,tracking.**

I. INTRODUCTION

Image processing is processing of images using mathematical computation by using any form of signal processing for which the input is an appearance, such as a photograph or video frame; the outcome of image processing may be either an appearance or a set of constituting or parameters related to the appearance. Most image processing techniques involve treating the image as a two-dimensional event and applying standard indication-processing techniques to it. Image processing is always refer to digital image processing, but there are optical and analog image processing also is possible.

Object tracking is connected in the activity of

Motion-based recognition-it is, human identification based on gait,automatic object detection, etc. automated surveillance-it is, monitoring a scene to detect suspicious activities or unlikely events. video indexing-It is, automatic annotation and retrieving of the videos in multimedia database.

human-computer influence-

it is, gesture recognizing,eye steady tracking -for data input to computers, etc.

traffic viewing-

it is, realtime gathering of traffic analysis to direct tra ffic flow.

vehicle navigating-

it is, videobased path planning and obstacle a voidance

capabilities.

II. OBJECT REPRESENTATION

In tracking scene, a thing can be defined as anything that is of interest for further analysis. For example, boat on the sea, fish inside a aquarium, vehicle on a road, planes in the air, people walking on a road, or bubble in the water are a set of things that may be important to track in a specific influence.Things can be represented by the imaginary and by appearing.we are first describing the object shape representation commonly made for tracking and then place the joint shape and appearance representation.

A.Points

An object can be characterised in terms of set of points that occupy small region of interest used for small area tracking purpose.Object may also be represented as a single point called as centroid of a person.

B.Geometric shapes

This is most suitable for simple rigid-objects. The shape of object can be represented as rectangle or ellipse, also used for non-rigid object tracking.

C.Object silhouette

The area inside the contour represents the silhouette of an object.Contour represents borderline of an object.Both contour and silhouette are used for

complex
non-rigid shape tracking.

D.Skeletal Model

Object skeletal used to model articulated and rigid objects.It can be extracted by medial axis transform,to object silhouette. Medial axis represents the distance to the boundary.Every point P in a region R finds the nearest neighbour in the
boundary, and its point belong to average axis of the region. It is used in modelling purpose for distinct and rigid objects.

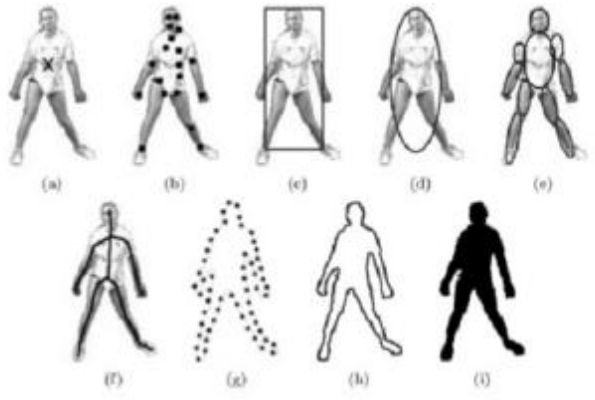

Fig.Object representing (1) Centroid, (2) multiple points, (3)
rectangular patch, (4) elliptical patch, (5) part-based multiple patches, (6) object skeleton, (7) complete object contour, (8) control points on object contour, (9) object silhouette

A shape representation is combined with appearance feature of an object for tracking. The commonly used appearance features are listed below:

E.Probability density appearance model

This model is used in Gaussian mixture models and histogram. The probability density of image such as color,texture etc., can be computed from image regions.

F.Multiple-view object recognition

This approach models an object with the series of view; each view contains information about small range of viewing condition.The representation can be completed in two processes: one is sample images must be clustered into group that represents different view of an object. Second is the group members are widespread to form model-view characteristics.

G.Templates

Geometric shape represents a template, which contains both spatial and appearance information. It is mainly used for object tracking purpose.

III. FEATURE SELECTION OF TRACKING

In image processing, a feature is in simple term, a piece of information relevant for sorting out the computational activity related to a specific application.Features may be specific structures related to the image like edges, points, objects,
texture, etc. In complex scenarios sometimes only one type of feature may not give sufficient information of the image data, which results in two or more features to be extracted. Most of the color object tracking algorithms use HSI color of the object
and are robust to lightning variations. The classification accuracy for color feature vectors is better while using RGB features, but these features are sensitive to lightning changes. Scale Invariant Feature Transform (SIFT) is used for extraction of local feature descriptors. SIFT is robust local invariant feature descriptor and designed mainly for gray images.Edge features are found to be less sensitive to illumination changes than color descriptors. With the expense of additional computational time and processing steps texture features may also be used. A variety of more feature descriptors exists such as biological features, optical flow etc. Features are used to differentiate between foreground object and background object.

A. Color

In image processing RGB (red, green and blue) color feature space is used to represent color. The RGB space [13] uses combination of color and contour feature in particle filter based object tracking. Color is influenced by two physical factors which are spectral power distribution and surface reflectance properties. Hue, saturation (lightness) and value (brightness) (HSV) are the three components of HSV space is also one of the uniform color space but it is sensitive to noise.

B. Edges

Edge detection is used to identify changes in image intensity. As compared to color feature edges are less sensitive to illumination changes [10]. [15] States that it is used in 3-D model based algorithm

which uses edge point as the feature selection. To track the boundary of an object edge feature is used.

C. Texture

It is used for surface variation and segmentation of image with properties such as smoothness and regularity. Image texture gives the information about spatial arrangement of colors. Two categories uses it they are region based and boundary based. The local binary pattern (LBP) texture is one of the famous pattern analysis for gray-scale images.Some of the tracking based algorithm such as CAM Shift is based on LBP texture for moving object tracking [17].

D. Moment A moment based region feature is used for object recognition and determine the gender of a strange person by walking appearance.

IV. OBJECT DETECTION

Every tracking technique requires an object finding mechanism either in every frame or when a thing first appears in the video. A common technique for object detection is to use information in one frame. However, some object detection technique make use of the basic information calculated from the order of frames to reduce the number of false detections. This primary information is usually in the form of frame variation, which highlight the changes of regions in consecutive frames. Given the object region in the appearance, it is then the tracker's task to perform object corresponding from one frame to next to generate the track.

1.Point Detectors

Point detector is used to find interest points in appearance which have an expressive texture in their respective localities.concern points have been long used in the context of movement, stereo, and tracking problem. A desirable quality of an concern point is its invariance to changes in intellectual and camera viewpoint. To detect points, Moravec's operator calculates the variation of the image strength in a 4 x 4 patch in the horizontal, vertical, oblique direction and anti oblique directions and chooses the lowest of the four differences are as representative values for the window.A point is declared concerning if the strength variation is a local maximum in a 12 ×12 patch

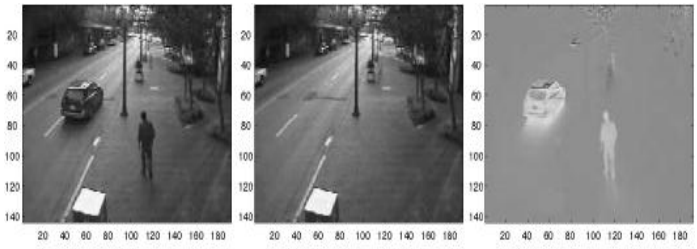

Fig: concern points detected by applying (a) the Harris, (b) the KLT, and (c) SIFT operators.

2.Background Subtraction

Object detection can be done by building a representation of the picture is known as the background image and then finding deviations from the image for every incoming frame.Any important change in an image area from the background image signifies a moving object. The pixels create the regions enduring the change are marked for further process.Normally, a connected component rule is applied to obtain connected areas corresponding to the object. This process is known as the background subtraction.

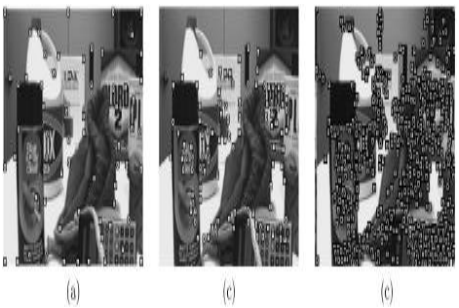

Fig.Background subtraction based on eigen space(space is build with objects in the camera of FOV): (a) an input image with objects, (b) reconstructed image after casting input image onto the eigenspace, (c)image difference. Note that the objects nearer to viewer are clearly identifiable.

3.Segmentation

The intend of image segmentation rules is to seperate the image into pertaining Similar areas. Every segmentation rule addresses two problems, the criteria for a best partition and the method for achieving best possible partitioning.

Mean-shift based segmentation requires good tuning of different parameters to obtain best segmentation, for example,an act of the color and existing kernel bandwidths, and the threshold value for the least size of the area which considerably effects the resulting

segmentation.

V. OPTICAL FLOW

Optical flow is a vector-based technique that calculate motion of video by matching points on object over multiple frames. It is a vector field that describes the speed of pixels in an image progression.In using optical flow,a way of detecting difficulties in a mobile robot environment by partitioning them from the first floor in an image order is proposed. The optical flow rule used to detect any possible action pixels in the video picture.Rules is based upon optical flow field and self-serving threshold. segmentation is suggested in to detect moving object area precisely.

VI. OBJECT CLASSIFICATION

Classification is a process in which each items like objects, patterns, image area, pixels,etc are clustered based on the resemblance between the item and the description of the cluster. In object classification they are shape-based, motion-based, color-based and texture based classifications.

VII. OBJECT TRACKING

Tracking means to follow a specific object which is moving. In normal terms tracking is the problem of calculating the curve of an object in the image plane as it turn around a picture.Another method,a tracker assigns agreeing labels to the tracked objects in various video frames.Depending upon tracking influence,procedure and algorithm,a tracker can also give object pertaining circumstance like area, orientation and shape of an object.If an objects is detected,

the next step in video surveillance procedure is to track the objects from one frame to another. Tracking objects can be difficult due to different object shapes, object movement, non- rigid nature of object,image display changes, partial or full object occluded,etc. These can be less complicated by a simple limitation like the object movement is smooth with no sudden changes,former knowledge about number, size of objects, object appearance and shape. There are various tools available for object tracking including Blob tracking, Kernel based tracking, feature matching, Kalman filter, the Condensation rule,the dynamic Bayesian network,the geodesic technique, etc. Tracking procedures are mainly splitted into types:feature-based tracking ,model-based tracking : region based tracking and active-contour-based tracking,

A.Region-Based Tracking

Methodology works on tracking objects as per divergence of the image sections for moving objects. For our understanding, if we consider instance of vehicle detection, this detects each vehicle blob using a cross correlation method. Based upon background subtraction, motion areas are particullarly identified by subtracting the background from the current image. M Kilger used the same technique in his study of real-time traffic monitoring system for detection of moving vehicles. It is complex to detect the vehicles under congested traffic, because vehicles partly occluded with one another. In number of research methodologies, a Gaussian distribution of pixel value is used to represent both human body and background scene. To detect person's body parts such as head, hand, etc. is a critical part. C R Wren and Ali came with a solution to develop a real-time system known as pfinder (person finder) which solves the problem of a single person using a fixed camera.

A mixture of color and gradient information is used which is obtained from background subtraction technique to handle with shadow and unpredictable color clues. To difference between the objects during occlusion color clues are used.Instead of using a human body technique, paper represents a color based tracking system. The visual parts depend on clothing of a person and differ with person's mode of dress.There are some situations like two objects have dressed same then the tracker will fail to track when they make a group.

B.Active Contour Based Tracking

This technique tracks moving objects by representing their boundry as bounding contours and keep updating it dynamically. It reduced computational difficulty compared to the area based detection. Paper combines both motion information and appearance information to detect the walking person. Motion information can be extracted from confining of images. The advantage of these simple filters is their calculation time is low as related with others.Uses countour based approach for which during occlusion the shape of an object is regain by maintaining a shape-prior which is built online. To

provide safety to drivers and to avoid accidents that is caused by dim rear light of lamps, a novel image processing technique is used which deals with vehicle rear-lamp pair for detection and tracking. Lamps are symmetric and paired using a color cross-correlation proper analysis and tracked by using Kalman filter.

C. Feature Based Tracking

This technique targets detect and track with elements extraction, clustering and matching features of pictures.It tracks sub-features such as differenciable lines or points on the object.In force of feature based tracking can be efficiently improved by adding basic motion rules.Partial occlusion problem can be resolved up to some extent with some of the sub-features remains visible. Polana and Nelson shows the recognition of repetitive motion activity like walking can be accomplished by bottom-up operation. This repetitive motion activity is a very strong reliable information which the actor can be segmented,normalised and recognised. when rigid normalisation cannot be carried out the activity recognition fails.

VIII. PROBLEM DOMAIN AND FUTURE WORK

We explained detail here with in object tracking section, difficulty increases with shape, size, orientation and many of such factors.Challenges like, difficulty in tracking complex objects like faces,segmentation errors, etc., effect of change of lightning condition and shadows.There might be more possibility of disturbance in object tracking due to other objects. To handle multiple structures and interaction between them from a noisy, irregular grouped data-set a unified computational framework is introduced known as tensor voting. It is a non-repetitive method that holds the surface and curve inference from 2-D or 3-D point. Tensor voting is a robust technique and as no restriction on surface topology. Fig.explains the work performed by tracking process from object detection, recognising to object tracking. The video captured using a static camera is input form.process steps goes like detect object, recognise the object of interest, then use of background subtraction technique to extract foreground and providing bounding box.Color based modelling is done for each pixel which is known as a tensor and voting process which is done based on scale. The resulting tensor contains orientation and magnitude information. This is given as an input to Gaussian component that relates the color representation in connecting frames. If the comparison is done successfully then object is tracked successfully but if matching is not similar then a new object has entered the image.

Fig.Block diagram of object tracking using tensor voting framework

IX. CONCLUSION

In this paper we have seen about image processing and object representation, object detection, feature selection of tracking, object tracking and problem domain and future works. Our further research process will focus on to develop a color based tracking method which can deal with both partial and complete occlusion effectively by modeling color clothing using tensor voting framework.

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