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Video Sequence Object tracking and optimization using Particle Filter Morphological Optical Flow Technique

Vandita Singhi[1], Dr. Malti Bansal[2]

Department of Electronics and Communication Engineering, Delhi Technological University, India.

vandita.0504@gmail.com[1], maltibansal@gmail.com[2]

ABSTRACT: 'The object tracking in video processing technology has been growing for numerous years. Currently, when people are in conversation with their networks through a visual handset or when people use picture propagation through Internet or digital music such as mp3, the suitability that the digital video developed conveys to us cannot be elapsed. This work establishes object tracking for real time video that finds the motion compensated movie processing by using support vector machine. Firstly, we have occupied an item as the position object or image. Then, the next-in-sequence object is connected with the reference object or image. Each time the sequential object is associated with the reference object, it creates an absolute difference and the summation of all these differences displays its entirety of complete difference.

KEYWORDS: Object tracking, SVM, Gabor optical flow Median filter etc.

I. INTRODUCTION

In recent time, there has been an increasing interest in image tracking and activity recognition systems; due to the large amount of applications those features can be used. Median filtering is used for training abstraction which is future abstracted from the wave structures for object detection. The distance moved through the automobile is designed using the association of the centroid ended the edges. The image coordinates of the centroid are mapped to World space. The world coordinate distance is extra mapped to actual distance using pixel to distance ratio. By this evidence, the rapidity of the vehicle is projected.

1.1. Introduction to Tracking

There has been an increasing interest in image tracking and activity recognition systems due to the large amount of applications those features can be used. Constraints in the configuration of the moving objects can be used to decrease its complexity. The constraints can be deduced from demonstration, based on different activities. An image tracking system is industrialized using this kind of constraints and then evaluated. The fact also that the constraints are based on activities allows, while doing the tracking, the inference of the activity the object is performing.

1.2. Tracking: Probable Problems and Applications

Particular method to decrease the difficult space and to create the problem computationally manageable is to gives controls on the locations of the object. Controls can similarly base on temporal information, camera formation, or any grouping of these. Camera alignment constrictions are typically communicated through making expectations on the comparative putting of the issue with respect to the camera.

1.3. Video tracking

Video is the motion of image in a frame with respect to time by using the property of persistence of vision. It is required that more than 15 frames are to be moved per second(fps).For the smoother appearance 30 fps is necessary.

1.4. Visual Perception

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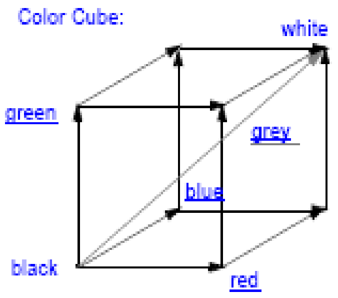

Figure 1 : Visual Perception.

The human eye consists of Cones – to perceive color
Rods – to perceive brightness
Color defined as a mix of RGB.R for Red, G for Green and B for Blue.

1.5. Video Generation

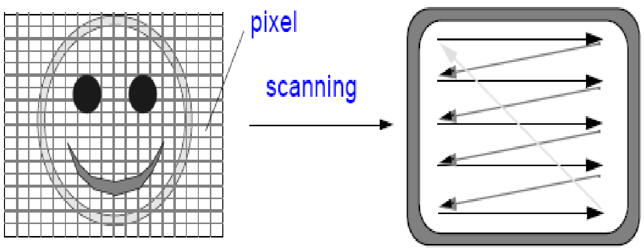

Figure 2: Video Generation.

II. RELATED WORK

Hsu-Yung Chenget at.el [1] the author has projected an approach namely Dynamic Bayesian Network in Aerial surveillance for vehicle detection framework. This technique has tractability and good generality capabilities but recognition consequences can be stabilized through achievement automobile tracking on the vehicle detection.
Badri -Li Liane et.al [2] have suggested the whole method of voting-based motion valuation, touching object edges discovery and content-based collection coding at sequential and three-dimensional scales. These procedures showed that, under incomplete network bandwidth, the communicated image feature can be regularly attained and the transmission bandwidth operation can be efficiently summary. But the disadvantage of this technique is that there is no measured sensing.
Bing-Fei et al. [3] He has planned a novel method to video-based traffic investigation using a fuzzy hybrid evidence implication instrument. There are three approaches of this planned technique related informing, vehicle detection with block-based division, and vehicle tracking with error reparation. In this study technique contributes Good performance under congested situation inside channel but the excellence of taken image was poor.
Hidetomo Sakaino [4] has projected a stretched Markov chain Monte Carlo technique for tracking and a protracted hidden Markov model technique for learning/recognizing some moving objects in videos with jittering circumstances. These approaches can cope with a mutable sum of moving objects at much lower control cost but when altered innovations were close and innovative size was too small failure arisen.

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Yin-Tsung Hwang and et al. [5] have accessible article abstraction and feature corresponding methods in this investigation. In the feature mining four calculations ascent paths are assumed.

Herminio Chavez-Roman and et al. [6] have proposed a novel set of rules called super resolution using wavelet domain interpolation with edge elimination and spare image. This procedure reports the problem of making a super-resolution image from a single lower explanation input image in the wavelet area. This research investigate the improved intelligence and less pressing at the edges, avoiding pixel blocking, blurred particulars, and ringing artifacts nearby edges but this technique is not capable to category better robustness of noisy images.

Badri Narayan et al. [7] have recommended a new procedure for moving object detection and following. This algorithm contains two assemblies: one for spatio-temporal three-dimensional separation and the new for sequential segmentation.

Marius Leordeanu et al. [8] have projected a innovative classical and algorithm for widespread border detection. Gb efficiently syndicates multiple low- and mid-level clarification layers of an image in a principled manner, and resolutions their limits mutually, in closed-form, in instruction to calculate the precise border strength and location. [8].

Vasileios T. Chasanis, Aristidis C. Likas, and Nikolaos P. Galatsanos [9] planned an algorithm in the part of video indexing, which need the well-organized subdivision of video into acts. They use representative scene detection procedures [9]

Yun Zhai, Student and Mubarak Shah [10] projected the videos, Contain of numerous frequent shots that are taken by unlike camera processes, e.g., on/off processes and substituting among cameras.

III.SYSTEM MODEL

3.1. Modeling and Simulating Video and Imaging Systems

The Video and Image Processing Blockset extends Simulink with a specialized library for designing the behavior of your imaging system. In Simulink background offers implements for ordered demonstrating, data organization, and subsystem customization that kind it easy to generate concise, precise symbols, regardless of our system's complication.

3.1.1. The Algorithm for Object Detection

1. Initially the first frame is considered as the background (bg).
2. For each pixel of the next input frame (fr) Deduct the pixel intensity value from the background image.
   Difference = fr-bg
   IF(Difference> Threshold)
   fg = bg
   ELSE
   fg = 0
3. For each pixel of the background
   IF (fg > bg)
   bg=bg+1
   ELSE
   bg=bg-1
4. Perform certain Morphological operations on the extracted image 'fg' to improve the image quality.
5. Calculate the Centroid (c1, c2) of the binary image fg. The result of this operation is a set of two integers which determine the position of the moving object in the given frame.
6. Use Median Filter to improve the correctness of the obtained centroid values.
7. Get the next input frame and Go to (Step 2).

3.1.2. Optical Flow Algorithm

a) The optical flow calculation is grounded on two molds:

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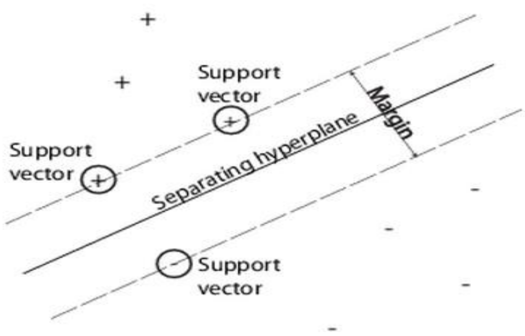
The investigational illumination of some object point is continuous over time. Close to facts in the image level move in a comparable method (the rapidity smoothness restraint). Assume that constant image; f(x,y,t) refers to the gray-level of (x,y) at time t. Demonstrating a dynamic image as a purpose of location and time certifications it to be communicated.

- Undertake that every pixel passages but does not change strength.
- Pixel at position (x, y) in frame1 is pixel at ($x+\Delta x$, $y+\Delta y$) in frame2
- Optic flow connections program vector with each pixel.

3.1.3. Support Vector Machine

This techniques (such as support vector machines, Bayes point machines, kernel principal component analysis, and Gaussian processes) represent a major development in machine learning algorithms. Support vector machines (SVM) are a group of managed learning approaches whit can be functional to organization or regression. Support vector machines signify an allowance to nonlinear simulations of the widespread representation algorithm advanced by Vladimir Vapnik. The SVM procedure is grounded on the arithmetical knowledge.

Support Vector Machines classifier is used to identify the followed object. SVM classifier is controlled knowledge that associates with mechanism learning process that analyses and distinguishes the data used for organization. SVM usages Middle filter which kinds the scheme stronger by tracking and decrease the noise presented by improper detections. The *SVM* are the data facts that are neighboring to the extrication hyperplane; these facts are on the border of the slab. The subsequent figure demonstrates these descriptions, with + representative data points of type 1, and – representative data points of type –1.



Formulation: Primal. This conversation surveys Hastie, Tibshirani, and Friedman[19] and Christianini and Shawe-Taylor [11].

The data training is a fixed of points (vectors) x_i along with their groups y_i. For some measurement d, the $x_i \in R^d$, and the $y_i = \pm 1$. The calculation of a hyperplane is $<w,x> + b = 0$,

Where $w \in R^d$, $<w,x>$ is the internal (dot) product of w and x, and b is real.

The subsequent problematic describes the *best* extrication hyperplane. Discover w and b that reduce $||w||$ such that for all data points (x_i,y_i),

$$y_i(<w,x_i> + b) \geq 1.$$

The support vectors are the x_i on the borderline, those for which y_i $(<w,x_i> + b) = 1$.For calculated suitability, the problem is typically assumed as the equal problem of reducing $<w,w>/2$. This is a quadratic software design problem. The best solution ($\hat{w}$,$\hat{b}$)allows organization of a vector z as shows:

$$\text{Class }(z)=\text{sign}(\text{E}\hat{w},z\text{F}+\hat{b}).$$

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3.1.4. Euclidean Distance

Euclidean distance is the distance among two points in Euclidean space. Euclidean space was initially developed by the Greek arithmetician Euclid about 300 B.C.E. to study the associations among angles and distances.

a) Phase 1

Calculate the Euclidean distance for 1-D. The distance among two points in one dimension is basically the complete value of the change between their Organizes.

b) Phase 2

Take 2 ideas P and Q in 2-D Euclidean space. We will define P with the organizes (p1,p2) and Q with the organizes (q1,q2). Now make a line section with the endpoints of P and Q. This line section will form the hypotenuse of a right triangle. Prolonging the consequences gotten in Stage 1,

c) Phase 3

Usage the Pythagorean Theorem to control the length of the hypotenuse in Stage 2. This formula conditions that c^2 = a^2 + b^2 where c is the length of a right triangle's hypotenuse and a,b are the lengths of the additional two legs. This bounces us c = (a^2 + b^2)^(1/2) = ((p1 - q1)^2 + (p2 - q2)^2)^(1/2). The distance among 2 points P = (p1,p2) and Q = (q1,q2) in two dimensional space is then ((p1 - q1)^2 + (p2 - q2)^2)^(1/2).

d) Phase 4

Range the consequences of Stage 3 to three dimensional spaces. The distance among points P = (p1, p2, p3) and Q = (q1, q2, q3) can then be assumed as ((p1-q1)^2 + (p2-q2)^2 + (p3-q3)^2)^(1/2).

e) Phase 5

Simplify the explanation in Stage 4 for the distance among two points P = (p1, p2, ..., pn) and Q = (q1,q2, ..., qn) in n scopes. This overall solution can be assumed as ((p1-q1)^2 + (p2-q2)^2 + ... + (pn-qn)^2)^(1/2).

3.1.5. Bounding Box

The reset Tracks purpose makes a variety of tracks, where every path is a construction demonstrating a affecting thing in the video. The determination of the group is to preserve the state of a followed object. The state contains of data used for discovery to track project, track conclusion, and demonstration.

The structure contains the following fields:

- id : the numeral ID of the path
- b-box : the present bounding box of the purpose; used for display
- Median Filter: a Median filter object used for motion-based following
- age : the number of frames since the track was first detected
- Total Visible Count : the entire amount of frames in which the way was perceived (visible)
- Consecutive Invisible Count: The quantity of successive frames for which the path was not perceived (invisible).

Noisy credits incline to consequence in short-lived paths. For this aim, the instance only shows an object after it was followed for some amount of frames. This occurs once total Visible Count exceeds a recognized threshold.

3.1.6. Median Filter

Median filter is a usually used image processing, we need to decrease noise before image processing, median filter procedures control the values of an odd pixel window W, window size of each pixel set allowing to Gray, middle gray value in its place of the innovative F(i,j) the gray value, gray value as the center of the window g(i,j).

$$G(i,j)=\text{median}\{F(i-k,j-l),(k,l \in w)\}$$

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IV. EXPERIMENTAL RESULTS

The video sequence used in Figure 1. The top row of it shows the position dimension. In frame the motion field of object moving (Figure 1), thus the detector procedures only one moving object for a of frames. Since of the projected classification Optical flow & SVM the Median filter we are able to track and label both object correctly when the motion fields splits again. This can be gotten in the bottom row. The center of the blue circle corresponds to the position information gained by the grouping step after the element update. The radius of this circle is fixed and only used for presentation. For this scene we had a hand-labeled ground truth. The mean position error between the proposed algorithm and the ground through lies by 2.68 pixels with an ordinary deviat ion of 1.5 pixels.

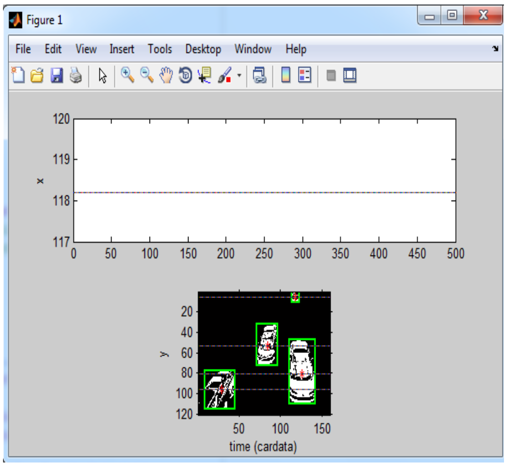

Figure 3: Input video frame moving object.

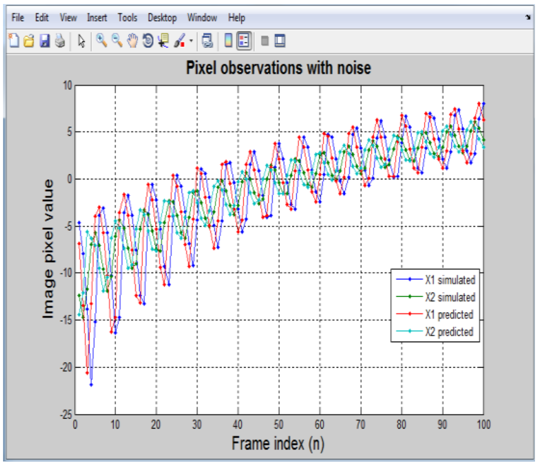

Figure 4: Pixel observation with noise of moving object.

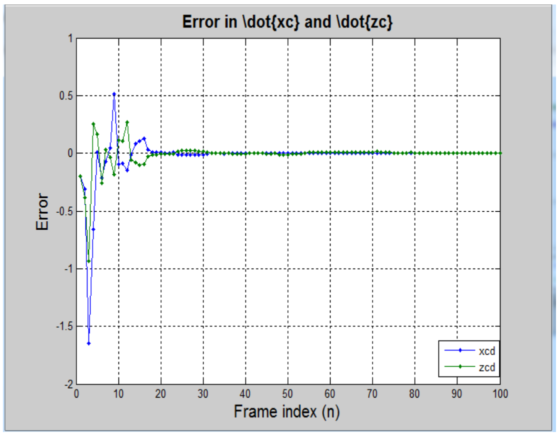

Figure 5: Error in XC & ZC of moving object.

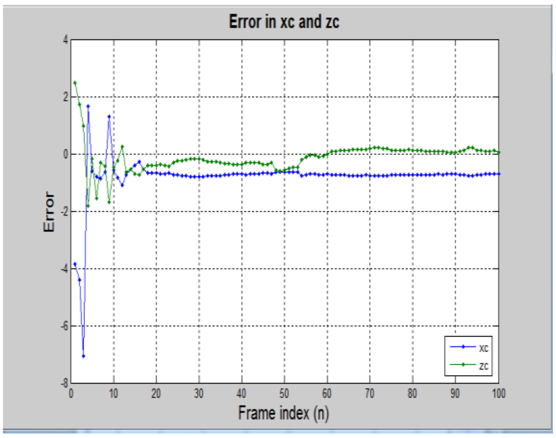

Figure 6: Pixel Error in dot {xc} & {zc} of moving object.

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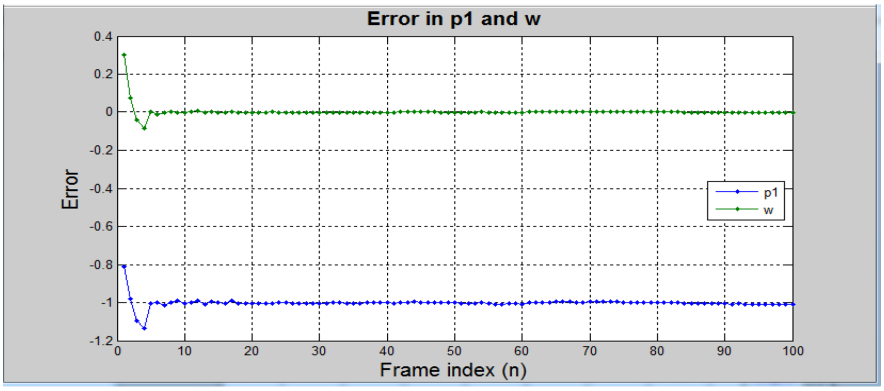

Figure 7: Error in p1 & w of moving object on Fame Index (n) & Error.

Pixel observation with noise	X1-Simulated	X2-Simulated	X1-Predicted	X2-Predicted
Fame Index(n)	-23 up to 0.2	-16 up to 0.8	-22 up to 6.4	-17 up to 0.7
Image Pixel Value	-5 up to 6.5	-12 up to 6.1	-6 up to 7.4	-7 up to 0.8

Table 1: Pixel observation with noise of moving object

Error in p1 & w	P1	W
Fame Index(n)	-0.8 up to 100	0.3 up to 100
Error	-1.3	-0.4

Table 2: Error in P1 & W of moving object

Error in xc & zc	XC	ZC
Fame Index(n)	-8.5 up to 100	-3 up to 100
Error	0.18	2.3

Table 3: Error in xc & zc of moving object

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V. CONCLUSION

In summary, we presented a new technique for tracking both rigid and deformable objects in video measures, and lastly apply SVM to handle the obstruction problem. SVM, which is one of the main offerings of this broadside, eliminates the off-line, preprocessing step for producing a priori training set. The preparation set used for classical appropriate can be efficient at each frame to variety more strong object's shape under blocked condition. The on-line informing of the training set can appreciate a real-time, strong tracking scheme. We similarly obtainable a whole set of investigational results. New results confirm that the proposed algorithm can track objects under numerous circumstances such as noisy and low-contrast ailment, and it can also track the object-of-interest with incomplete obstruction and challenging circumstantial.

In future, these algorithms can be further extended for the use in real-time applications and object classifications. It can be changed to differentiate different class objects in real time video also apply 3D tensor mining that allows a more detailed classification of cars.

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