A Dynamic Object Tracking and Speed Weight Detection using DWT in Video Surveillance System

Dr. Venugopal Reddy.CH[1], Mr.Shaik John[2]

[1]Professor, RISE Krishna Sai Prakasam Group of Institutions,Ongole, , A.P, INDIA.
[2] Assistant Professor, RISE Krishna Sai Prakasam Group of Institutions,Ongole, A.P, INDIA.

Abstract— In recent decades, video traffic surveillance systems have become increasingly common as urban road congestion has gotten worse. Traffic management, safety, accident prevention, as well as other aspects of traffic can all be improved by the use of these tools. This vehicle's primary function is to gauge the current flow of traffic. As a result, determining a vehicle's speed becomes more challenging. The detection methods of moving objects are the most critical steps in speed assessment. To get over the limitations of the prior method, image processing is applied here. This paper's technique is based on a combination of noise removal, extraction of features, and vehicle tracking. Calculating vehicle speed is based on the distance covered by the vehicle and the frame rate. To handle wavelet-based moving object segmentation, an approximate median filter-based technique can be utilized. Using the provided method, we can avoid the problems of other image pixel methods, such as ghost, shadow, and noise. The performance of the recommended method is compared with the performance of standard spatial domain approaches.

Keywords: video** Surveillance**, Frame separation, wavelet transform, , object tracking , Performance measurement.

I. INTRODUCTION

Intelligent video surveillance is a new research direction in the field of computer vision. It uses the method of computer vision and detects the movement target in the monitoring scene by automatic analysis the image sequence by the camera recording. And the research on moving target detection and extraction algorithm can be said to be key issues in intelligent video. Its purpose is the detection and extraction of the moving targets from the scene of the video image sequence. Therefore the effective detection of moving targets determines the system performance. Therefore, this article focuses on key technology in the moving targets detection and extraction. In this paper, firstly, it has a brief introduction of pretreatment of the video images. It reduces the error in the image processing after. Secondly the paper focuses on analysis Comparison the two algorithms: the background subtraction and the frame difference. Lastly, this paper selects based on the background subtraction method to improve it and present a moving target detection algorithm based on the background which has dynamic changes.. The word surveillance is usually used to describe observation from a distance via electronic tools or other technological means.

Fig. 1 Example of CCTV camera

The term "CCTV" refers to a grouping of videotape cameras that are used to monitor people and property. CCTV cameras are most commonly seen in high-risk locations, such as banks, airports, and city centers. Camera, lens, and power supply are all components of a CCTV system. There are also recorders, VCRs, and digital video tape recorders and monitors to complete the set up. Using video cameras, closed-circuit television (CCTV) allows viewers to see only what is happening in a given location, on a restricted number of screens. It is the job of video surveillance systems to recognize and classify moving objects. In general, fixed-camera video surveillance systems are used during this step of the process. Backdrop subtraction is the most common method for recognizing moving objects, and it involves maintaining a current model of the backdrop and spotting those that differ from it. There are a number of factors that can affect the backdrop image, including: rapid changes in lighting, motion and camera oscillations as well as high-frequency surrounds objects (such as nearby trees, sea waves and similar).

II. LITERATURE SURVEY

Changing backgrounds, clutter, occlusion, shifting lighting conditions, automatic operation, and inclement weather can all pose issues when trying to segment video sequences. Fog, rain, snow, camera angle, and real-time processing requirements are just a few examples of these issues. [1-7]. Zhang [4] classified segmentation methods into six categories: threshold-based, pixel-based, range-based, color-based, and edge person identification, all of which are based on rough set theory. Recursive and non-recursive background adaptative techniques are also categorized by Cheung and Kamath [6]. A sliding-window approach is used in a non-recursive method to estimate the backdrop. Moving averaging of Gaussian, Temporal Median Filter, and Mixture of Gaussian function are some of the video object segmentation methods that can be found in the literature [1-5]. GMM with an online EM algorithm is an example of a method that is both time-consuming and space-consuming (Temporal Median Filter is proposed in all the methods discussed as above for the moving objects) inability to remove noise from repeated frames due to either sluggish motion or incorrect segmentation of moving objects The presence detecting ghosts in segmented objects and the identification of only moving objects are the other two limitations.

III. EXISTING SYSTEM

Background subtraction method

Backdrop subtraction is the process of removing the picture from an image that represents the background. Modeling the background creates a reference image instead. For a certain recognition rate, a set of appropriate threshold values is selected and then subtracted. Color-subtraction techniques or arrangements help to identify which pixels belong in the foreground or the background (including plain and colored foregrounds) or which pixels are part of a moving object.

Subtract the background picture B(X, Y) from the existent frame FK after obtaining the background color B(X, Y) (X, Y). A moving object appears to be a set of pixels whose difference between them is larger than the threshold T; otherwise, the pixels appear to be background pixels. Moving objects can be detected after threshold operations. The following is to say it:DK X, Y = {if (|FK(X, Y) – B(X, Y) | > 1)

0 others

Models based on background subtraction are highly sensitive to changes in the surrounding environment outside of the simulation chamber. Slow illumination changes can be accommodated by approaches that use a single scalar value as the basis of the background model, but multi-valued background distributions are not. As a result, people are more likely to make mistakes in those situations. The amount of time it takes to detect an object using this method is low, but the level of accuracy may not be sufficient.

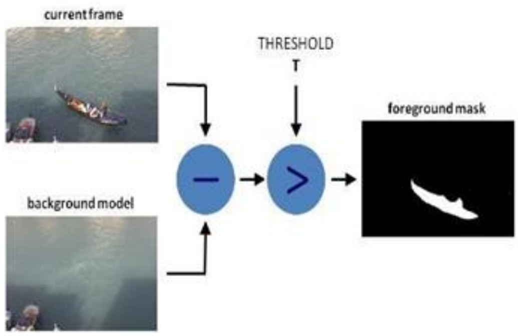

Fig. 3 Example of Background subtraction method

IV. PROPOSED METHOD

The proposed solution is based on a complicated wavelet domain approximation of a median filter. A method for getting video object planes that offers the changing pixel values from consecutive frames is used. Our method begins with the sophisticated wavelet domain decomposition of consecutive frames (In-1 and In). Then we use an approximate median filter to detect frame differences.

The process algorithm is described as follow:

1. The first step is to record a video.
2. Separation of the frames
3. Keeping the image sequence in the displayed frame distinct from the background image
4. In both the background and current image, use wavelet transform
5. Reversal of wavelet transform
6. Detection threshold for the foreground (discovery)
7. Removal of noise
8. the ability to detect and track moving objects
9. Speed and weight are also important factors in determining a vehicle's

A. Block diagram for Proposed Method

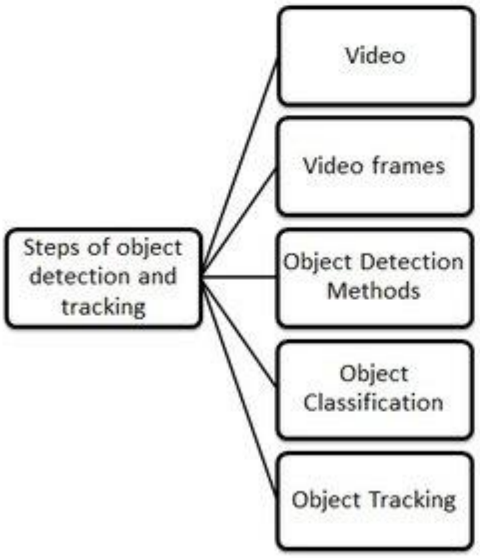

Fig.5 block diagram for proposed method

By applying an approximate median filter-based approach to the decomposed wavelet domain, we can determine the frame difference between two successive frames (I n-1 and I n). The coordinates of frame I n I j) and I n1 I j) for each pixel position I j)

$$FD_n(i, j) = WI_n(i,j) - WI_{n-1}(i,j) \qquad (2)$$

Where $WI_n(i,j)$ and $WI_{n-1}(i,j)$ are wavelet coefficients of frame $I_n(i,j)$ and $I_{n-1}(i,j)$ respectively. Obtained results may have some noise. Applying the soft Threshold to remove noise. In presence of noise, equation is expressed as:

$$FD_n'(i, j) = FD_n(i, j) - \lambda \qquad (3)$$

The equivalent noise components, denoted by, correspond to the different levelled without noise, FDn' I j). Soft thresholding in the wavelet domain is used to estimate the frame difference FDn' for de-noising purposes (i, j). It is possible to get the spatial segmentation of a moving object by using an Inverse Wavelet Transform (En). There may be a few disconnected edges in the final segmented image since the moving object's edges weren't perfectly segmented. As a result, in order to construct connected edges from an object edge map after it has been post processed, some morphological operation is required. Binary morphological operations are employed here. A segmented moving object is obtained after applying the morphometric operator M (En) and then the model depicts is updated to reflect changes in history and lighting conditions.

B.SPEED

The frequency (rate) at which consecutive images (frames) show on a display is known as the frame rate (fps). Film and video cameras, computer graphics, and motion capture technologies are all included in the definition of this word. The hertz unit of measure for frame rate is the frame frequency.

SPEED=FRAME/SEC

C.WEIGHT

Vehicle Static

Using the Vehicle Body block, you can simulate a two-axle vehicle body that is moving longitudinally. Each axle of the vehicle can have the same number of wheels or a different number of wheels. In this case, two wheels would be on the front axle and one wheel would be on the back axle. The size of the vehicle's wheels is presumed to be the same. The vehicle's center of gravity (CG) can also be at or below the plane of travel, depending on the configuration.

$$\alpha = \frac{(f \cdot h) + (F_{zf} a) - (F_{zr} b)}{J}$$

Vehicle Dynamics

The vehicle motion is a result of the net effect of all the forces and torques acting on it. The longitudinal tire forces push the vehicle forward or backward. The weight mg of the vehicle acts through its center of gravity (CG).

$$m\dot{V}_x = F_x - F_d - mg \cdot \sin\beta$$

$$F_x = n(F_{xf} + F_{xr})$$

$$F_d = \frac{1}{2} C_d \rho A (V_x + V_w)^2 \cdot \mathrm{sgn}(V_x + V_w)$$

V. EXPERIMENTS AND RESULTS

It has been possible to obtain current qualitative effects by utilizing the proposed technique for detection of moving objects in input video that represents typical situations critical to security camera systems, as well as experimental results for the detection of moving objects using the proposed technique. This is accomplished through the use of Mat lab, a challenging piece of computer software. It's much easier to build good code in Mat lab because of the toolboxes for image collection and processing that are already there.

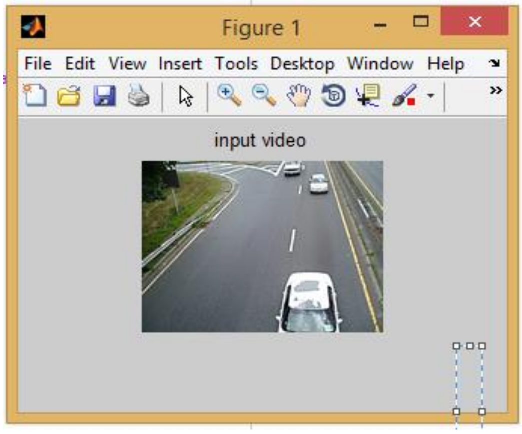

Fig: input video

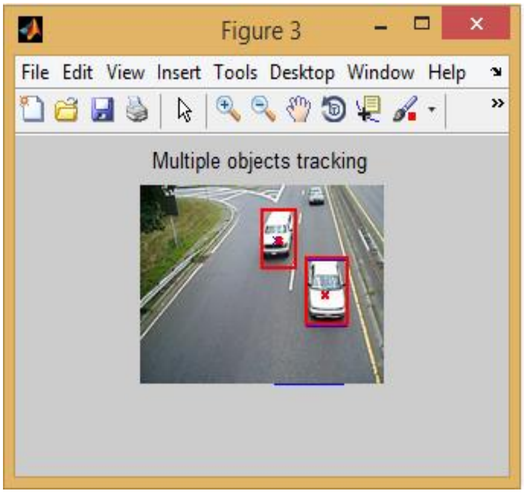

Fig: multiple object tracking

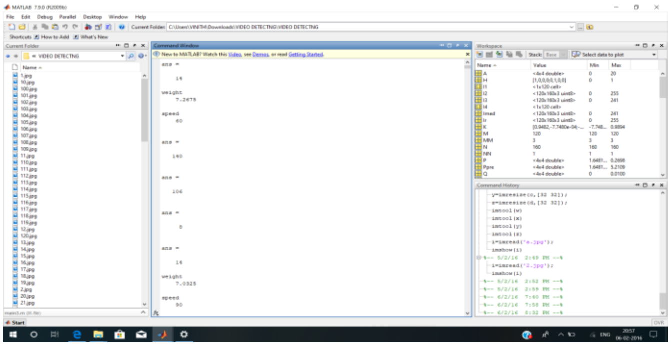
Fig: speed and weight calculations

VI. PERFORMANCE EVALUATION

There is a clear correlation between performance evaluation and the fact that none of the earlier proposed segmentation algorithms produce a flawless segmentation result compared to ground accuracy frames. It has been shown in this paper that the proposed strategy can be quantitatively compared to other current methods. Various parameter settings can be used to estimate system performance as part of the testing for the proposed system. Several quantitative measurements, including video quality and MSE, PSNR, correlation coefficient, and similarity, show improved performance with the new method.

A. Mean Square Error (MSE) and the Peak Signal to Noise ratio (PSNR)

Both the MSE and the Peak Signal to Noise Ratio (PSNR) are used to compare the quality of picture compression. Both the MSE and the PSNR are used to calculate the total squared error between a compressed and uncompressed image. The lower the MSE number, the less error there is. The first block computes the mean-squared error using the following equation to compute the PSNR:

$$MSE = \sum_{M,N} [I_1(m, n) - I_2(m, n)]^2 / M * N \quad (4)$$

In this equation, M and N are the number of rows and number of columns in the input images, respectively. Now the block computes the PSNR by the following equation:

$$PSNR = 10\log_{10}\left(\frac{R^2}{MSE}\right)$$

(5)

With a PSNR of 40 dB or higher, the original and recreated images are virtually indistinguishable to human viewers when using images with 8 bits per pixel or sample. R is the maximum variance in the input picture data type. R is 1, for example, if the data type of the input representation is double-precision floating-point. R is 255 if it is an 8-bit unsigned integer, and so on.

B. Correlation coefficient:

This reveals the statistical correlation between two or more random variables or observed data values. If A and B are both matrices or vectors of the same size, then this calculates the correlation coefficient between A and B.

Table-1. Values of MSE, PSNR and correlation coefficient and for frame no 29.

INPUT	Inp1.avi
GT:	29.bmp

S.NO	Parameter	Method	
		Background Subtraction	DWT(haar) +BS
1	MSE	0.0119	0.0084
2	PSNR	63.0219	66.4709
3	Correlation coefficient	0.6976	0.8079

VII. CONCLUSION

In this study, we provide a new vibrating camera approach for improving vehicle recognition and counting in dirty and snowy weather. To recognize automobiles, we employ a new and better background subtraction technique. In this section, we use a background subtraction technique to eliminate virtual blobs and reduce the influence of dusty weather conditions with a vibrating camera. More data was obtained for vehicle verification in each frame by using a tracking step based on their previous frame information as well. A generalized particle filter was used to put this notion into practice, and the better detection and counting that resulted as a result. With our results, we found that our proposed strategy worked well in a wide range of challenging settings, including bright evenings and snowy weather. Compared to other studies, our results are in line.

Vehicle weight and speed were more accurately calculated under more difficult conditions.

VIII. REFERENCES

[1] Wang Ying-li , Dai Jing-min, "Moving Targets Detection and Tracking Based on Nonlinear Adaptive Filtering," 2007 International Conference on Computational Intelligence and Security Workshops (CISW 2007), pp. 691-694, December 2007.

[2] Yang Shu-Ying , Zhang Cheng , Zhang We-Yu , He Pi-Lian, Unknown Moving Target Detecting and Tracking Based on Computer Vision, Fourth International Conference on Image and Graphics (ICIG 2007), pp 490-495, August 2007

[3] Tan Jiyuan, Wu Chengdong, Zhou Yun, Hou Jun, Wang Qiaoqiao, "Reasearch of Abnormal Target Detection Algorithm in intelligent Surveillance System", Proceedings of the 2009 International Conference on Advanced Computer Control, IEEE Computer Society, 2009.

[4] Fa-quan Zhang , Yong Zhang , Li-ping Lu , Li-ying Jiang , Guang-zhao Cui, "Speedy Detection Algorithm of Underwater Moving Targets Based on Image Sequence," 2009 International Conference on ComputerEngineering and Technology, pp. 230–233, January 2009

[5] Mayur D. Jain, S. Nalin Pradeep. A video surveillance system under varying environmental conditions. Proceedings of the 24th IASTED international conference on Signal processing, pattern recognition, and applications,ACTAPress, February 2006.

[6] By M. A. Zerafat Pisheh , A. Sheikhi, "Detection and Compensation of Image Sequence Jitter Due to an Unstable CCD Camera for Video Tracking of a Moving Target," Second International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT'04), pp. 258- 261, September 2004

[7] M.-C. Tsai, K.-Y. Chen, M.-Y. Cheng, K. C. Lin, "Implementation of a real-time moving object tracking system using visual servoing" Cambridge University Press , Volume 21 Issue 6, December 2003.

[8] Mahesh C. Pawaskar1, N. S.Narkhede2,Saurabh S. Athalye1,"Detection Of Moving Object Based On Background Subtraction," International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Volume 3, Issue 3, MayJune 2014

[9] A. Khare, U. S. Tiwary, W. Pedrycz, M. Jeon, "Multilevel adaptive thresholding and shrinkage technique for denoising using Daubechies Discrete wavelettransform", The Imaging Science Journal, Vol. 58, No. 6, Dec. 2010, pp. 340-358.

First Author:

Dr.CH. Venugopal Reddy is working as Professor & HoD in the department of ECE, RISE Krishna Sai Prakasam Group of Institutions,Ongole, affiliated to JNTU Kakinada, A.P. Has more than 21years of teaching experience. He got his B.Tech(ECE) from K.S.R.M. Engg College, Kadapa, A.P, affiliated to S.V University, Tirupathi, A.P. M.E (Commn.Sys) from Dr. M.G.R Engg College, Chennai, T.N affiliated to Anna University, Chennai and Ph.D from ANUCET,Acharya Nagarjuna University,Guntur,AP. He has a good No. of research publications in his credit. His research interests are in the areas of Image Processing, Signal Processing and Communications.

Mr. shaik john is working as Assistant Professor in the department of ECE, RISE Krishna Sai Prakasam Group of Institutions, Ongole, affiliated to JNTU Kakinada, A.P. Has more than 10 years of teaching experience. He got his B.Tech(ECE) from BVSR Engineering College ,Chimakurthy A.P, affiliated to JNTU Kakinada, A.P. M.Tech (DECS) from BVSR Engineering College ,Chimakurthy A.P, affiliated to JNTU Kakinada, A.P. He has a good No. of research publications in his credit. His research interests are in the areas of Image Processing, Signal Processing and Communications.