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A DYNAMIC MOVING OBJECT DETECTION AND SEGEMENTATION USING WAVELET TRANSFORM IN VIDEO SURVEILLANCE

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Abstract— Video surveillance is a very lively research topic in the form few years due to its growing importance insecurity, law enforcement, and military applications. This work presents moving object segmentation and tracking basedon background subtraction under the different (dissimilar) types of wavelet transform domain for the video surveillance system. The object detection will be approached to segment objects from foreground in the absence of backgroundnoise in frequency domain. At first it begins with background initialization by selecting first frame or taking initial few frames with an approximate median method. Then, the transform of the wavelet is applied to both current and initialized background frame generates sub-bands of low and high frequencies. The Differencing of the frames will be done in this sub-bands followed one by one edge map (diagram) creation and image reconstruction. In order to eliminate some unnecessary pixels, morphological erosion and dilation process is performed for object edge softness. The proposed method has some advantages of background noise insensitiveness and invariant to varying clarification or illumination conditions. Performance of method will be measured (between frame ground truth and obtained result) after the object detection, through metrics such like sensitivity, exactness, correlation and peak (climax) signal to noise ratio. This object detection too helps to track detected object using connected component analysis. The fake result shows that the used methodologies or methods for effective object detection have better accuracy and with less processing time consumption (use) rather than presented methods. The experimental results show that the most suitable method that runs quickly,perfectly or exactly and adapted for the real-time detection.

Keywords: Input video, Frame separation, wavelet transform, Sub band differencing, Motion detection, Performance measurement, Morphological Filtering

I. INTRODUCTION

Surveillance means that monitoring of behavior. Andthe meaning of systems surveillance is the process ofmonitoring performance of people, objects or processes within systems for consistency to expected or desired in trusted systems for security or social control. The word surveillance is usually used to describe observation from a distance via electronic tools or other technological means.

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Fig. 1 Example of CCTV camera

At the basic level, computers have surveillance goal because huge amounts of personal information are stored on top of them. Anyone who can access or remove a computer can retrieve information. If somebody is capable to install software on a computer system, after that they can turn the computer into a surveillance device. CCTV is a collection or a album of videotape cameras used for video surveillance. CCTV's are usually used in the areas where there is a better need for security such like banks, airports and town centers. A CCTV method comprises of the Camera, lens and power supply, recording devices and VCR (video recorder) or a digital video tape recorder and monitor. Closed-circuit television (CCTV) makes use of video cameras to broadcast a signal to a specific place, on a limited set of monitors. The main tasks in the video surveillance systems include motion detection, object classification, tracking. Our focus here is on the finding phase in general video surveillance system using fixed cameras. The typical approach for object detection in motion is throughout background subtraction that consists in maintaining an up to date form of the background and detecting moving objects when those that deviate from such a model. The background image is not permanent but must and should adapt to: lighting changes, sudden (such as clouds), Motion changes,camera oscillations, and high-frequencies surroundings objects (such like tree branches, sea waves, and similar) change in the background geometry.

II. LITERATURE SURVEY

Several problems may happen while segmenting the video sequences because of changing background, clutter, occlusion, varying illumination conditions, automatic operation, bad weather conditions such problems are fog, rain, snow, camera angle, and real time processing requirements etc. [1-7]. Zhang [4] divided the techniques of segmentation into six groups:- Threshold based techniques, Pixel organization based techniques, Range image segmentation, Colour picture segmentation, Edge detection based segmentation techniques based on fuzzy set theory. According to Cheung and Kamath [6], background adaptative techniques can also be categorized as: 1) non recursive and 2) recursive. A non-recursive method estimates the backdrop based on a sliding-window approach. Various video object segmentation methods can be found in literature [1-5] such as Running Average of Gaussian,Temporal Median Filter, and Mixture of Gaussians. These are any too time consuming methods (similar to GMM with online EM algorithm) or too space consuming (Temporal Median Filter is proposed in all the methods discussed as above for the moving objects) suffer from the trouble of either slow speed or inaccurate segmentation of moving object suitable to non-removal of noise in repeated frames. The other boundaries include

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detection of only moving object and the presence of ghosts in segmented object. Cheng *et al.*[11] Was projected a discrete wavelet transform (DWT) based techniques for approach , inter-frame differencing technique is used for moving object segmentation in DWT domain. DWT based methods are shift-sensitive. Any shift sensitive methods will not provide good results for video applications because in video application, objects are present in shifted form. Motivated by these facts, a new technique using discrete wavelet domain for video segmentation is proposed in this paper. The DWT contain advantages of shift invariance and better directional selectivity. As compared to DWT the performance and presentation of the proposed model is compared with other standard methods available in journalism such as Frame Difference, Background subtraction, SOBS [12-15].

A. Frame Difference

This method is during the difference between two consecutive images to determine the occurrence of moving objects.

Fig. 2 Example of Frame Differencing Method

The Frame differencing may be the simplest form of background subtraction. Frame differencing is also known as temporal difference, uses the video frame at the time t-1 as the background method for the frame at time t. This technique is sensitive to noise and variations in light, and does not trust local consistency properties of the change mask. This method also fails to

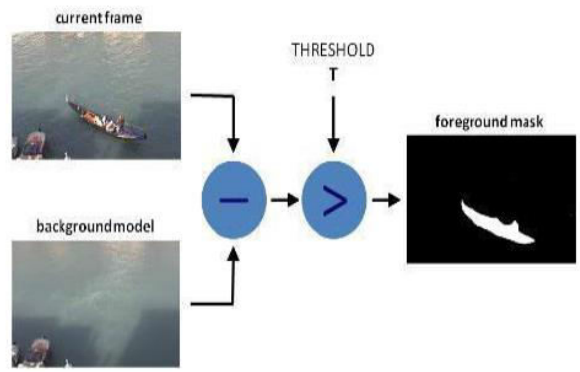

Fig. 3 Example of Background subtraction method

segment the non-background objects if they stop moving. While it uses simply a single previous frame,frame differencing might not be capable to recognize the internal pixels of a large, uniformly-colored moving object. This is usually known as the space problem. It has strong adaptableness, but in general difficult to obtain a whole outline of moving object, liable to show the empty phenomenon, as a result the moving object detection is not exact.

B. Background or Backdrop subtraction

The basic design of background subtraction means to subtract the image from an indicated image that models the background scene. Background modeling constructs a reference image instead of the background. Threshold selection determines suitable threshold values used in the subtraction operation to get a desired recognition rate. Subtraction process or pixel arrangement classify the type of a given pixel, i.e., the

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pixel is a part of background (including ordinary background and shaded background), or it may be the moving object. After background image B(X, Y) is obtain, then subtract the background image B(X, Y) from the existing frame FK(X, Y). If the pixel differencing is greater than the set threshold T, then determine that the pixels are appear in moving object, otherwise, like the background pixels After threshold operation the moving object can be there detectedIts expression is as follows:

$$DK\,X,Y = \begin{cases} \text{if } (|FK(X,Y) - B(X,Y)\,| > \;\; 1) \quad (1) \\ 0 \text{ others} \end{cases}$$

Background subtraction model is very sensitive to changes in exterior environment. The methods with a background model based on a single scalar value can guarantee adaptation to slow lighting changes, but cannot cope with multi-valued background distributions. As such, they will be prone to errors whenever those situations arise. Processing time requisite to detect the object using this technique is low but exactness might not be good enough.

C. SOBS (Self organizing background subtractionmethod)

This is a biologically motivated problem-solving technique based on visual attention mechanisms. This approach defines a method for the generation of an active attention focus to monitor dynamic scenes for observation purposes. The idea is to construct the background form by learning in a self-organizing manner many background variations, i.e., background motion cycles, seen as trajectory of pixels in time. Based on the learnt background method during a map of motion and stationary patterns, this can notice motion and selectively inform the background model. Every node computes a function of the biased linear combination of incoming inputs, where weights may be similar to the neural network learning. Doing so, each node could be represented by a weight vector obtained to collect the weights related to incoming links. In the following, the set of the weight vectors will be called a *model*. An incoming prototype is mapped to the node whose model is "most similar" to the sample, and weight (mass) vectors in a neighborhood of such nodes are updated. Therefore, the network behaves like a competitive neural network that implements a winner take- all the function with a connected system that modifies the local synaptic plasticity of the neurons, allowing learning to be restricted spatially to the local neighborhood of the most active neurons. For each color pixel, consider the neuronal map consisting of n*n weight vectors. Each incoming sample mapped to the weight vector that is closest according to a proper distance measure, and the weight vectors in its neighborhood are updated. The whole set of mass vectors act as background model, that is used for background subtraction method in order to recognize moving pixels [1-10].

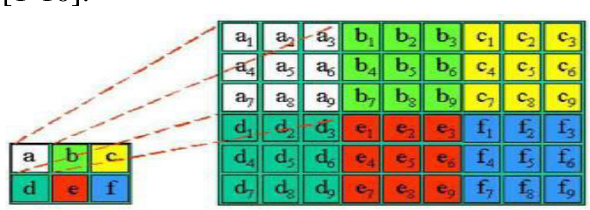

Fig. 4 Simple image (Left) and the (right) neuronal map structure

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The future technique is an approximate median-filter based technique in discrete wavelet domain. Differencing in frames is used for obtaining video object planes which gives the changed pixel values from repeated frames. First, we decompose the video in to two consecutive frames (In-1 and In) using Discrete wavelet transform and then apply estimated median filter based technique to detect frame difference. For every pixel location (i, j) the match of frame

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

Where WIn(i,j) and WIn-1(i,j) are wavelet coefficients of frame In(i,j) and In-1(i,j) respectively. Obtained results may have some noise. Applying the soft Threshold toremove noise. In presence of noise, equation is expressed as:

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

III. PROPOSED METHOD

The proposed method is Background subtraction,method based on this effective detection of moving object can be done using Wavelet transform.

The process algorithm is described as follow:

1. Input video
2. Frame Separation
3. Image series
4. Separation of Image Sequence in presented
Frame and Background Frame Image
5. Apply wavelet transform for both background
and present image
6. Sub-band Differencing
7. Soft threshold
8. Inverse wavelet transform
9. Threshold for foreground detection(discovery)
10. Noise removal
11. Morphological filtering
12. Moving Object Detection
13. Performance measurement (Similarity/MSE/PSNR/Correlation)

A.Block diagram for Proposed Method

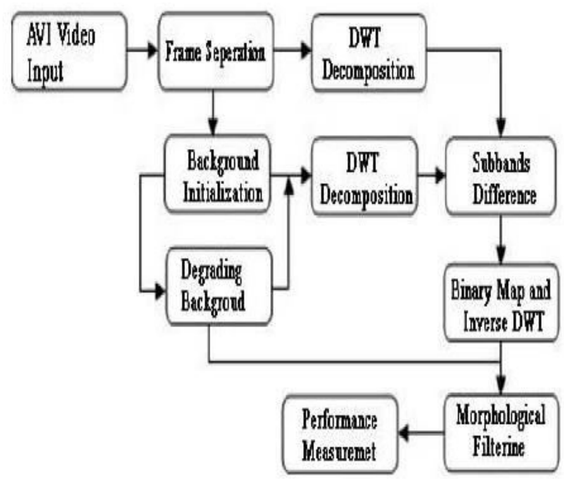

Fig.5 Block diagram for proposed method

Where *FDn (i, j)* is frame difference without noise, λ represent to equivalent noise components. For denoising, soft thresholding method in wavelet domain is used for the estimation of frame difference *FDn'(i, j)*.Inverse wavelet transform is applied to get the segmentation of moving object in spatial domain i.e.En. The obtained segmented object may include a number of disconnected edges due to non-ideal segmentation of the moving object edges. Therefore, some morphological procedure is wanted for post processing of object edge map to produce connected edges. Here, a binary closing morphological operation is used. After that applying the morphological

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operator M (En) is obtained which is segmented moving object, and finally temporal updating the background model is wanted in order to adjust the changes in background and in lighting conditions.

IV. EXPERIMENTS AND RESULTS

In this work the aim is to build such a surveillance system, which will detect motion even if the moving background, gradual illumination variations and camouflage and shadow into the background, thus achieves strong detection for dissimilar types of videos taken by stationary cameras. To fulfill this aim, tough computing software is used called Mat lab. Mat lab provides image acquirement and Image Processing Toolboxes which make easy us to create a good code.

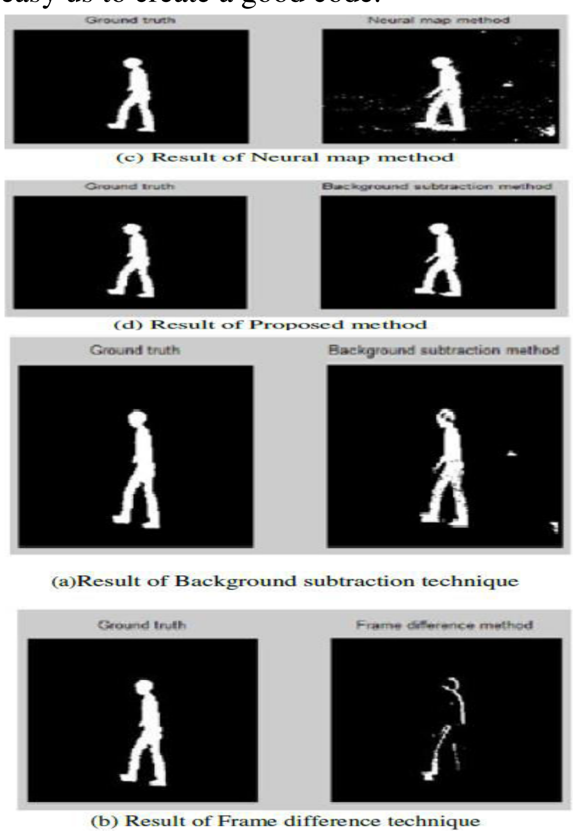

Fig.6 Results for Input video sequence

corresponding to Frame no 29 Experimental results for the detection of moving object using the proposed technique have been produced for input video that represent usual situations critical for video surveillance systems, and current qualitative results obtained with the proposed technique and other three methods are also efficient conditions of accuracy is better than other methods.

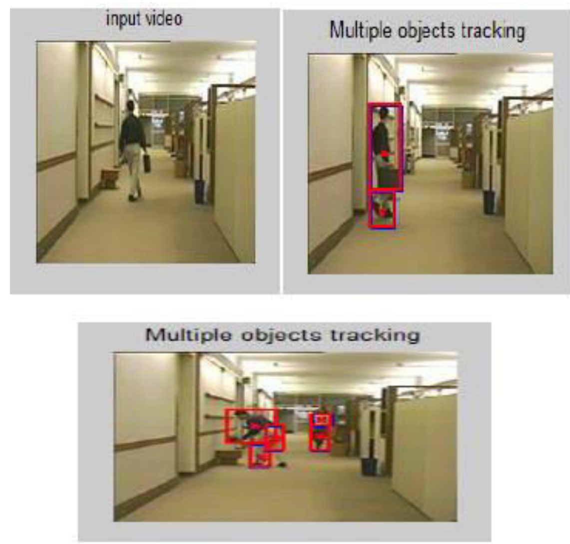

Fig.7 Result of objects tracking

V. PERFORMANCE EVALUATION

Performance evaluation can be observed and taken from the results that none of the earlier proposed segmentation algorithms give perfect segmentation result as compared to ground accuracy frames. In this paper, the presentation of the proposed technique has been compared quantitatively with other state-of-the-art methods. The proposed system is testing with different settings of changeable parameters which can be used for performance estimation. Performance of the proposed technique is found better in terms of video performance and a number of quantitative measures viz. MSE, PSNR,

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correlation coefficient and similarity. This section outlines the rest of performance evaluation metrics that have implemented in order to quantitatively analyze the presentation of object detection methods. For measuring accuracy we adopted different metrics.

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

The Mean Square Error (MSE) and the Peak Signal to Noise Ratio (PSNR) are two error metrics are used to compare image compression quality. The MSE represents the collective squared error between the compressed and the original image, while PSNR represents to calculate the peak error. The worse value of MSE is lesser the error. To compute PSNR, the first block computes the mean-squared error using the following equation:

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

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:

$$PSNR = 10 \log_{10}(R^2 / MSE) \quad (5)$$

The PSNR between two the images having 8 bits per pixel or sample in terms of decibels (dBs) is usually when PSNR is 40 dB or greater then original and recreate images are practically indistinguishable by human observers . Within this equation, *R* is the maximum variation in the input image data type. For example, if input representation has a double-precision floating-point data type, then *R* is 1. If it have an 8-bit unsigned integer data type, *R* is 255, etc.

B. Correlation coefficient:

This gives statistical relationship among two or more random variable or observed data values. This calculates the correlation coefficient between A and B,where A and B are matrices or vectors of the same size.

C. Similarity:

We measured the pixel based similarity measure as Similarity = Greatest value of similarity shows accurate detection of the moving object.

Table-1. Values of MSE, PSNR, correlation coefficient and Similarity for frame no 29.(INPUT: Inp1.avi,GT: 29.bmp)

S.no	Parameter	Method				
		Background Subtraction	Frame Difference	Neural Map	DWT(db5) +BS	DWT(haar) +BS
1	MSE	0.0129	0.0487	0.0245	0.0098	0.0092
2	PSNR	67.0219	61.2563	64.2436	68.2	68.4709
3	Correlation coeffiecient	0.8676	0.2783	0.8041	0.9032	0.9079
4	Similarity	0.9871	0.9513	0.9755	0.9902	0.9908

VI. CONCLUSION

In the video surveillance, here are many noisiness factors such like target changes, complex scenes, and target deformation (twist) in the moving object tracking. In this paper the detection of moving objects using discrete wavelet transform domain have been proposed. The performance of the proposed technique have been evaluated and compared with other standard methods in consideration in terms of various performance metrics. From the obtained results and their qualitative and quantitative analysis, it can be concluded that the proposed technique is performing better in comparison to other methods as well as it also capable of alleviating the problems associated with other spatial domain methods such as ghosts, clutters, noises etc. used. Future work will address on techniques to get better results to get better the human detection methods and occlusion handling in surveillance applications

REFERENCES

[1] Alok Singh Kushwaha, Rajeev Srivastava",Complex Wavelet Based Moving Object Segmentation Using Approximate Median Filter Based Method for Video Surveillance,"2014 IEEE International Advance Computing Conference pp. 973-978, 2014

[2] R. T. Collins, A. J. Lipton, H. Fujiyoshi, T. Kanade. Duggins, Y. Tsin, N. Enomoto, D.Tolliver, O.Hasegawa, L. Wixson and P. Burt, "A System for Video Surveillance and Monitoring", Tech.Rep. CMU-RI-TR-00-12, the Robotics Inst., Carnegie Mellon Univ., Pittsburgh, PA,2000.

[3] L W. Hu, T. Tan, "A Survey on Visual Surveillance of Object Motion and Behaviors", IEEE Trans. Systems, Cybernetics, and Man, Vol. 34, No. 3, pp. 334-352, 2006

[4] Tao Jianguo, Yu Changhong, "Real-Time Tracking and Detection of Moving Object, "Intelligent Information Technology Application, 2008. UTA '08. Second International Symposium on Volume 2, 20-22 Dec. 2008 Page(s):860 – 863

[5] M. Piccardi, "Background Subtraction Technique: an examination," in *Proc. IEEE Int. Conf. Systems, Man, Cybernetics*, 2004, pp. 3099–3104.

[6] S.C. Cheung and C. Kamath, "Robust Method for Background Subtraction in Urban Traffic Video," Image Processing and Video Communications, SPIE Electronic Imaging, UCRL Conf. San Jose, vol.200706, Jan 2004.

[7] L. Maddalena and A. Petrosino, "A Selforganizing Approach to Finding of Moving Patterns for Real-time Applications," in Proc. 2nd Int. Symp. Vision, Brain and Artificial Intelligence, 2007, pp. 181–190, Lecture Notes Comput. Sci. 4729

[8] N. McFarlane, C. Schofield, "Tracking and Segmentation of Piglets in Images", Machine Vision Application, No. 3,Vol. 8, pp. 187-193, 1995

[9] C. Stauffer , W.E.L. Grimson, "Adaptive Background Mixture Models for Concurrent Tracking," In Proc. Computer Pattern and Vision Recognition conference ,pp. 246-252,1999.

[10] Z. Zivkovic and F. van der Heijden," Efficient Adaptive Density Evaluation Per Image Pixel for the Task of Background Subtraction",Pattern Identification Letters, Vol. 27 No.7, pp. 773–780,

[11] F-H. Cheng, Y-L. Chen, "Real Time Multiple Objects Tracking and Recognition Based on Discrete Wavelet Transform", Elsevier journal of Pattern Identification, Vol. 39, No. 6, pp. 1126–1139, 2006.

[12] A. Khare, U. S. Tiwary, W. Pedrycz, M. Jeon, "Multilevel Adaptive Shrinkage and Thresholding Technique for Denoising using Daubechies DiscreteWavelettransform", The Imaging Skill Journal, Vol. 58, No. 6, Dec. 2010, pp. 340-358.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

[13] Mahesh C. Pawaskar1, N. S.Narkhede2,Saurabh S.Athalye1,"Detection Of Moving Objects Based On Background Subtraction," International Journal of Emerging Trends and Technology in Computer Science (IJETTCS), Volume 3, Issue 3, May-June 2014

[14] Pritee Gupta, Dr. Yashpal Singh, "Implementation of Dynamic Threshold Method for Human Motion Detection in Visual Surveillance Application," International Magazine of Computers and Technology, No. 8, 2014 Vol. 13,
.