iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4327

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

A Novel Approach for Improving the Accuracy of Moving Objects Detection and Tracking using an Advanced Pattern Matching Technique

Matheswari Rajamanickam[1], Dr. Aishwarya Palaniappan[2]
[1]*Assistant Professor, Department of Computer Science, M.E.S College of Arts, Commerce and Science, Bangalore, Karnataka, India.*
[2]*Professor and Head, Department of Computer Science and Engineering, Atria Institute of Technology, Bangalore, Karnataka, India.*

Abstract: Moving object detection and tracking is an essential part of digital image processing. Object detection and recognition used image processing techniques like image segmentation, classification and grouping of objects with pattern matching for addressing issues in different dimensions. Object tracking is very important in logical video surveillance system. This research papers presents a review on the standard existing techniques, which can be combined with several other advanced methods like extended kalman filtering for efficient moving objects detection and tracking. The present work focuses on the factors like object detection accuracy, object tracking time and pattern matching rate.
Keywords: Moving object detection; Object tracking; Video surveillance.

I. INTRODUCTION

Moving object detection is employed for identifying physical movement of an object in a specified region or area. The object detection method is used to detect the moving object areas with different sizes of objects and video progression. Moving objects are detected and tracked in several image processing applications areas like medical application, aerial image analysis and crowd monitoring system in public places. The perfect detection and classification of moving objects is an essential aspect of advanced driver assistance scheme. Object tracking in video sequence is very important in high level applications like video communication and compression, object recognition and robotic technology.

The image object feature representation, classification and object detection provides an efficient moving object detection and recognition. An object preserves a fingerprint in the hand image, a handwritten cursive word object, a human face in sequence of image frames of a video, etc. Camera movement evaluation supports video stabilization and integrates moving object detection. Attribute mining and classification enables exact evaluation of original and noisy pixels of the objects in image sequences of a video.

II. LITERATURE REVIEW

Object Tracking by Color and Active Contour method was presented in [3] for object recognition and tracking system. The tracking efficiency is increased for targets in motion and controlled the video capturing. However, the impacts of dynamic shadows are critical for foreground segmentation since objects are complex and can be hidden by other objects, during which the actual size and shape of the objects get distorted.

Multiple Sensor Fusion and Classification for Moving Object Detection and Tracking was presented in [2]. By performing multi-sensor fusion and classification approach, object is described at different detection levels. Object fusion is an important technique to solve the combined detection and tracking of moving objects with composite representation and undecided object features. However, the visual descriptors of the image are not considered for recognizing the moving objects.

A new method called Scale Invariant Feature Transform (SIFT) was presented in [10] for aerial video surveillance system for stabilizing moving object detection and tracking. Kalman filtering is applied to increase the accuracy of matching point and color information can be combined for a robust point matching strategy. However, the processing speed needs to be optimized.

Moving Object Detection and Tracking from Video Captured by moving Camera was presented in [5] for detecting moving object and tracking from a video sequence captured by a moving camera. However, the video sequences are complicated to categorize the features of moving object and incurs overhead in the computational cost. Detection and Tracking Moving Objects (DATMO) algorithm was presented in [8] for Low Cost, Robust and Real Time System for Detecting and Tracking Moving Objects to

Automate Cargo Handling in Port Terminals. However, the detector algorithm uses additional sensor providing unordered information.

III. MOVING OBJECT DETECTION AND TRACKING

The object detection method examines the moving object areas by varying object size in the video sequence. Object detection method increases the detection rate and reduces false positive rate. Moving object detection and tracking approaches using single-layer range finders' sensors for detecting and tracking the objects does not consider the required data. The detection algorithm is capable of recognizing the objects of the port container scenario with original size. The tracking efficiency is increased for objects in motion.

A. Video stabilization with moving object detecting and tracking for aerial video surveillance

Aerial surveillance system is employed for providing a large number of data evaluated with conventional surveillance system. The local characteristic mining and approximate global action exhibit that the Scale Invariant Feature Transform (SIFT) technique is more suitable for video stabilization and moving object detection function.

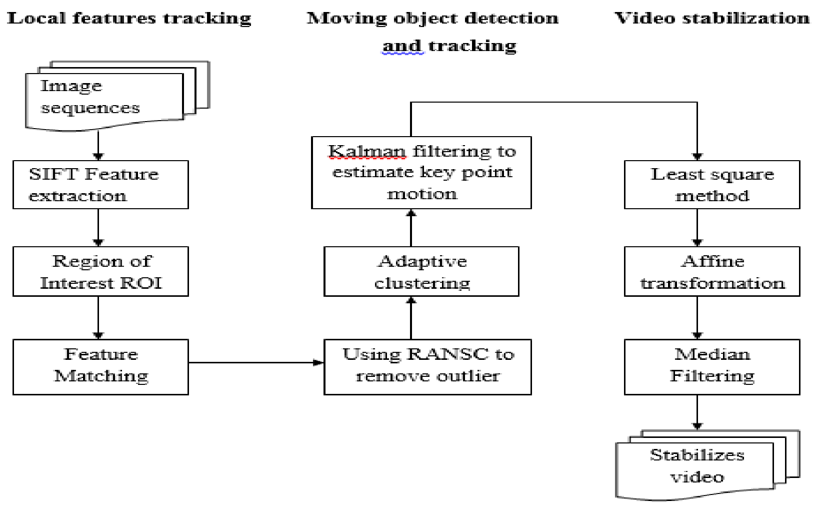


Figure 1 Flow chart of Scale Invariant Feature Transform (SIFT)

Figure 1 illustrates the flow chart of SIFT. The features of SIFT identifies the key points to be tracked over multiple structure of video and they are invariant to image conversion, rotation and scaling. The tracking method obtains the features of undesired motion, moving object and static object. The SIFT method uses global motion estimation method to eliminate noise values caused by camera vibration and noise. Moving object detection consists of both RANSC and Kalman filtering techniques. Motion compensation method is used to relate transformation. Aerial surveillance provides good quality video data for applications like search and rescue, military operations, commercial applications, counter terrorism and border patrol in an effective manner. The extraction and matching process for camera motion estimation is performed effectively and locates the regions of image where a residual motion occurs. Kalman filtering is best suited for increasing the matching points and color information can also be involved for robust point matching strategy. An attribute detectors and descriptors explains the SIFT methods which performs better on test sequences.

B. Object Tracking by Color and Active Contour Models Segmentation

Active Contour and Color Recognizing Software is used for detecting and tracking the object system. The association of different method is also employed for distinguish and tracking the object with dissimilar segmentation. The Active Contour and Color Recognizing approach for detecting and tracking also known as SRCCA (Software de Reconhecimento de Cor e Contorno Ativo or Active Contour and Color Recognizing Software) employs color recognition in the HSV color space and active contour models (ACM).

The relationship of image object with contour detection and segmentation technique represents an elaboration of an open source software language and Open Source Computer Vision (Open CV) functions, and is used for effective detection and tracking of moving objects. The tracking efficiency is used to enhance the Active Contour and Color for objects in action. The system was tested with the contour segmentation capabilities for objects in motion, irrespective of the shape and size of objects

C. Low Cost, Robust and Real Time System for Detecting and Tracking Moving Objects to Automate Cargo Handling in Port Terminals

Automatic cargo handling in port terminal is mainly used for recognizing and tracking of moving objects for different structure where the input data is given to a single layer laser scanner. Detection and tracking of moving object detection (DATMO) is the ability to identify the dynamic objects from the environment. Two approaches of the DATMO systems are tested to detect moving barrier and focused on tracking and filtering individual detections and other is focused on maintaining targets while no detections are offered. Both the methods are tested in the dataset with excellent consequences during tracking moving objects.

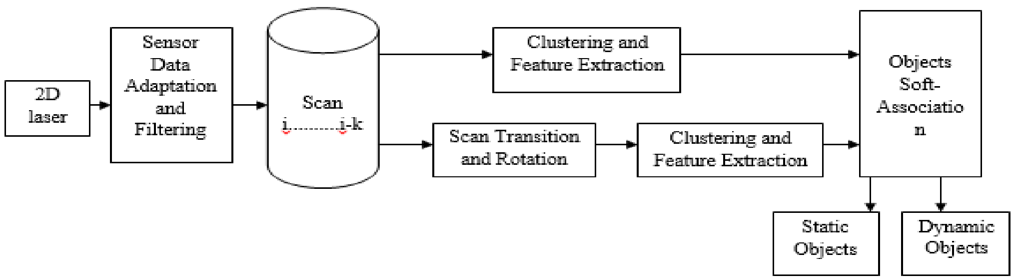


Figure 2 Modules of Moving Object Detection

Figure 2 describes the modules of moving object detector. The Input Data Adaptation and Filtering performs 2D laser scanning to obtain the filtered points that lie within the interface limit of the vehicle. The Scan Translation and Rotation method evaluates moving objects. Data Clustering performs collection of laser clusters using neighbor's proximity values. DATMO approach using single-layer range finder's sensors to detect and track the moving objects discards valuable information from small number of information. The detection algorithm recognizes the objects inside the boundary of the port container scenario with its original size. DATMO method is used to speed up the tracking phase by pre-selecting moving obstacles in the detection phase and thereby it reduces the false positive rate.

IV. COMPARISON OF THE EXISTING SIFT, SRCCA AND DATMO METHODS

In order to compare the performance of the existing methods, the number of object ranging from 10 to 70 is taken to perform this experiment. Various parameters are used for moving object detection and tracking methods.

A. Object Detection Accuracy

Object detection accuracy is defined as the ratio of the correctly identified objects to the number of objects taken. Object detection accuracy is measured in terms of percentage (%) and is mathematically formulated as follows,

$$Object\ Detection\ Accuracy = \frac{Correctly\ identified\ object}{Total\ number\ of\ objects}$$

Table 4.1 Tabulation of Object Detection Accuracy

Number of Objects	Object Detection Accuracy (%)		
	SIFT	SRCCA	DATMO
10	66	80	72
20	68	83	74
30	69	86	75
40	73	88	79
50	76	90	83
60	79	92	85
70	82	95	87

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Table 4.1 describes the object detection accuracy versus different number of objects in the range of 10 to 70. The object detection accuracy comparison takes place on the existing SIFT**,** SRCCA and DATMO methods. The existing SRCCA method has 16% higher accuracy than SIFT method and 9% higher accuracy than DATMO method.

B. Pattern Matching Rate

Pattern matching rate is defined as the ratio of the number of matched objects to the total number of objects taken. Pattern matching rate is measured in terms of percentage (%) and mathematically formulated as follows,

$$Pattern\ matching\ rate = \frac{Number\ of\ matched\ objects}{Total\ number\ of\ objects}$$

Table 4.2 Tabulation of Pattern Matching Rate

Number of Objects	Pattern Matching Rate (%)		
	SIFT	SRCCA	DATMO
10	78	66	71
20	84	69	74
30	87	73	77
40	90	75	79
50	92	78	81
60	94	81	84
70	96	85	87

Table 4.2 measures the pattern matching rate of existing techniques. Pattern matching rate of SIFT technique are more efficient than that of DATMO and SRCCA method. The existing SIFT method has 15% higher pattern matching rate than SRCCA technique and 10% higher pattern matching rate than DATMO method.

C. Object Tracking Time

Object tracking time defines the difference between starting time and ending time for tracking the object. The objective of the research work is to minimize the object tracking time. Object tracking time is measured in terms of milliseconds (ms) and mathematically formulated as below,

$$Object\ Tracking\ Time\ (ms) = Ending\ time - Starting\ time\ for\ tracking\ the\ object$$

Table 4.3 Tabulation of Object Tracking Time

Number of Objects	Object Tracking Time (ms)		
	SIFT	SRCCA	DATMO
10	26	35	19
20	28	37	22
30	31	40	24
40	32	43	27
50	34	46	29
60	37	48	30
70	40	50	33

Table 4.3 describes the object tracking time versus different number of objects in the range of 10 to 70. The Object tracking time comparison takes place on the existing methods SIFT**,** SRCCA and DATMO. The existing method, DATMO, consumes 24% lesser tracking time than the existing SIFT method and 64% lesser tracking time than the SRCCA method.

V. DISCUSSIONS ABOUT THE LIMITATIONS OF THE EXISTING METHODS

The existing DATMO method are used for single-layer range finder sensors by removing essential information from small number of data. The moving object detector using additional sensors provide uncontrolled image data in sequence.

The SRCCA method uses Active Contour and Color Recognizing Software for detecting and tracking the moving objects. However, the contour segmentation capability is reduced using this method. The conflict of dynamic shadows is vital for center segmentation specified that the objects are hidden by other objects and in which case, both the size and shape of the objects are distorted.

The existing SIFT method combines both video stabilization and moving object detection function. However, the method is not focused on color information. Hence this method is not suitable for affine transform estimation. Also maintaining the accuracy of moving object detection and tracking is yet to be addressed.

VI. CONCLUSION AND FUTURE WORK

The comparison of different techniques for moving object detection and tracking technique is carried out. First, the existing DATMO method is essential for tracking objects with reduced time. Next, the existing method SRCCA is found suitable for detecting objects more accurately. Finally existing SIFT method enhances the pattern matching rate. Hence for improving the accuracy of moving objects detection and tracking, the above stated methods can be combined with an advanced pattern matching techniques for addressing issues like dynamic shadow, occluded or hidden objects by several other objects, color and texture information about objects, the entry of multiple objects with high speed etc.,

REFERENCES

[1] Zhiyu Zhou, Dichong Wu and Zefei Zhu, "Object tracking based on Kalman particle filter with LSSVR", Optik - International Journal for Light and Electron Optics, Volume 127, Issue 2, January 2016, Pages 613-619.

[2] Ricardo Omar Chavez-Garcia and Olivier Aycard, "Multiple Sensor Fusion and Classification for Moving Object Detection and Tracking", IEEE Transactions on Intelligent Transportation Systems, Volume 17, Issue 2, Year 2016, Pages 525 – 534.

[3] A. S. Silva, F. M. Q. Severgnini, M. L. Oliveira, V. M. S. Mendes and Z. M. A. Peixoto, "Object Tracking by Color and Active Contour Models Segmentation", IEEE Latin America Transactions, VOL. 14, No. 3, March 2016, Pages 1488 – 1493.

[4] Suresh Smitha, K. Chitra and P. Deepak, "Recognition and Tracking of Occluded Objects in Dynamic Scenes", Advances in Intelligent Systems and Computing, Volume 338, Year 2015, Pages 91-102.

[5] Wu-Chih Hu, Chao-Ho Chen, Tsong-Yi Chen, Deng-Yuan Huang and Zong-Che Wu, "Moving Object Detection and Tracking from Video Captured by Moving Camera", Journal of Visual Communication and Image Representation, Volume 30, July 2015, Pages 164-180

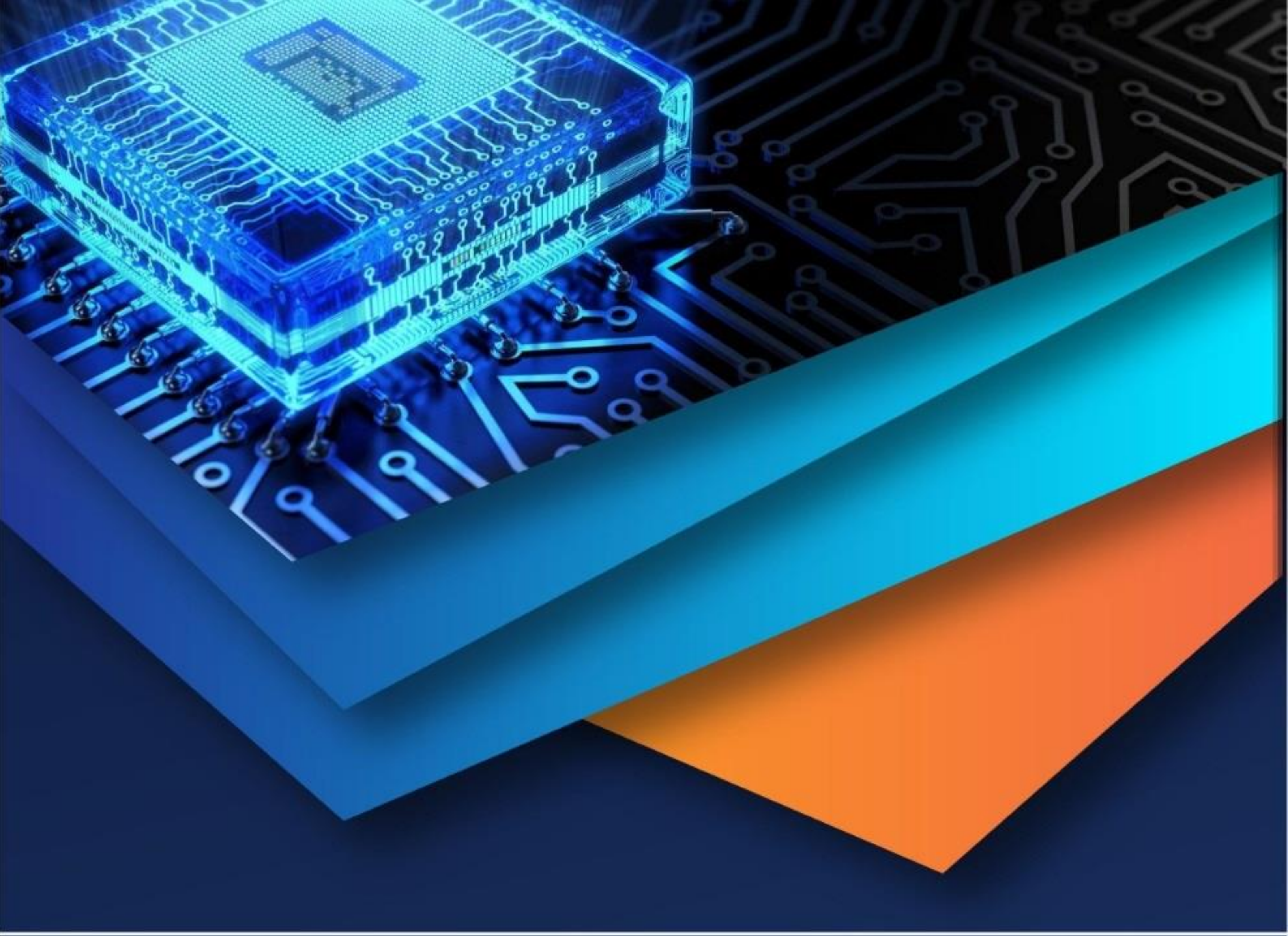
[6] Harish Bhaskar, Kartik Dwivedi, Debi Prosad Dogra, Mohammed Al-Mualla, Lyudmila Mihaylova, "Autonomous detection and tracking under illumination changes, occlusions and moving camera", Signal Processing, Volume 117, December 2015, Pages 343–354.

[7] Imen Karoui, Isabelle Quidu, and Michel Legris, "Automatic Sea-Surface Obstacle Detection and Tracking in Forward-Looking Sonar Image Sequences", IEEE Transactions on Geoscience and Remote Sensing, Volume: 53, Issue 8, Year 2015, Pages 4661 – 4669.

[8] Victor Vaquero, Ely Repiso, Alberto Sanfeliu, John Vissers and Maurice Kwakkernaat, "Low Cost, Robust and Real Time System for Detecting and Tracking Moving Objects to Automate Cargo Handling in Port Terminals", Advances in Intelligent Systems and Computing, Volume 418, November 2015, Pages 491-502.

[9] Ivan Huerta, Michael B. Holte, Thomas B. Moeslund and Jordi Gonz`alez, "Chromatic Shadows Detection and Tracking for Moving Foreground Segmentation", Image and Vision Computing, Volume 41, September 2015, Pages 42-53.

[10] Ahlem Walha, Ali Wali and Adel M. Alimi, "Video stabilization with moving object detecting and tracking for aerial video surveillance", Multimedia Tools and Applications, Volume 74, Issue 17, September 2015, Pages 6745-6767.



10.22214/IJRASET

INDEX COPERNICUS
45.98

IMPACT FACTOR:
7.129

TOGETHER WE REACH THE GOAL
IMPACT FACTOR:
7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY