Advanced Real Time Objects Detection and Tracking in HEVC Videos

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Abstract

In this paper, we propose a modern approach of tracking in which it detects multiple moving objects in videos compressed per H.265/HEVC standard. Our proposed paper work largely depends on motion vectors (MV) and block types obtained by partially decoding the video bit stream and occasionally uses pixel domain information to distinguish between two objects. In this work an approach to detect the moving object in compressed domain HEVC is discussed which is used in video surveillance system. Because High Efficiency Video Coding (HEVC) has a large potential to identify events by reusing coding structures in HEVC, which saves vast extent of computational resources. Here the feature Motion Intensity Count (MIC) makes use of motion vector, coding unit and prediction unit of HEVC. Our extensive experimental results demonstrate that the approach provides the remarkable performance and can classify moving person and vehicles accurately and robustly.

Keywords: Object Tracking, Object Detection, HEVC, Classification, MIC

I. INTRODUCTION

Multiple object detection is one of the vital technologies for intelligent vision applications such as Advanced Object Detection and tracking Systems, mobile robot vision, surveillance systems and portable devices [1]– [4]. These applications and others require real time processing and comparatively low power consumption. Real time processing with high frame rates is essential in proposed pater and UAVs, where the detection must be fast enough to allow sufficient time for any course correction. For robustness, multiscale detection is important to detect objects with different sizes and distances from the camera. An object’s height are inversely proportional to its distance from the camera [5]). Processing high resolution images, such as full high definition (HD) 1920 1080, is required to have enough pixels for early detection of far and small objects.

II. LITERATURE SURVEY

Now this chapter explains some of the motivations underlying the multiple object detection based video coding approach. Maanu Tam, R. Venktesh Babu [5], they both proposed a method for moving object detection in H.264/. AVC standard compressed domain. The proposed algorithm is mainly initially Segments based up on the quantization parameter and macro block size, their proposed approach allows the video stream to be encoded with various different quantization parameters across macro blocks there by increasing flexibility in bit rate adjustment. C. Poppee [5], they proposed a fast method for motion segmentation for H.264/. AVC based up on the size and transform coefficients used within the video stream. This algorithm needs the values of QP to be fixed while encoding, reducing bit rate flexibility.

Kalyani Goswami [6], she proposed a new mesh based moving object detection technique for tracking. A dense mesh has been generated on that part of a frame where the moving object are present else less dense mesh has been formed. This algorithm does not require any prior information about the location of the object inside a video frame. This algorithm captures moving object inside a video sequence without any pre- or post-processing. The motion characteristics are tuned manually. Dingming Liu [4], Here they introduced a new approach to extract the object based on moving detection and graph cut. Firstly, they get the moving information of the object in each frame with frame difference of three continuous frames.

Here the possibility foreground frame which will segment to extract, it can be solved by graph values, extracting the object in each frame with the graph values method to segment every frame to extract the multiple moving objects. This system still has some limitations. Firstly, when the foreground frame and background frame colors are very similar, high quality segmentation usually is hard to be obtained. Vijaya Jumb [7], this approach for color image frame segmentation is presented. In this algorithm foreground frame objects are distinguished clearly from the background frames. Initially RGB is converted into HSV and extract V from HSV, then apply Otsu on V channel and then apply K-means algorithm for over segmented.

III. PROPOSED SYSTEM

The proposed system is having first to analyze the captured image frames to find multiple moving objects, a decoding step is needed. By using this decoding step and we reused the work done during the encoding to detect multiple moving objects directly...
upon the compressed video stream. The vital idea in our proposed system is we are presenting segmentation to extract the multiple moving objects in HEVC standard compressed domain the general flow chart of the system is illustrated in following proposed diagram (2.1).

![Image](image1.png)

**Fig. 1: Block diagram of background subtraction method**

In this block diagram, there are two prominent things first one is reference image, it is for the reference while detecting object this play a prominent role and second one is input image it is for except reference image in the video frames, the difference between input image and reference image which gives a difference image so that with help of this we can detect an object easily, so this method is called as a background subtraction method. By thresholding and compensating we can detect exact objects with more accuracy for that dilation, erosion, opening and closing morphological image processing will gives an accurate result in detecting objects by background subtraction method. The above explanation block diagram is as shown below figure (2.2).

![Image](image2.png)

**Fig. 2: The system block diagram**

As we firstly going through the related standard compressed domain information in H.265 standard. In HEVC, all frame is firstly divided into squares of same size, i.e., largest coding units. Every LCU can be recursively divided into smaller unit until a proper partition reached. Every smallest unit is referred to as prediction unit (PU). For each inter-coded PU, there will be a motion vector (MV) indicating the best match position in the reference frame. Thus, to represent the motion intensity within a LCU. MIC for each LCU is defined as follows: Using $||MVi||$ the set of the MVs within the same LCU, $area(PUi)$ is the area of the PU containing this MV. LCU with larger MVs will have higher MIC.

Based up on the features like MIC and the MIC prediction method, as we multiple moving objects by identifying the differences between the predicted and actual MIC’s for every frame. For every currently checking frames, we predict MICs for current frame by previous frames, which are inside a sliding window of size $s$. For each LCU in current frame, with the predicted
MICs and actual MIC we can measure the differences. If difference is greater than zero, then there is possibility of moving objects are present in the LCU. Apply adaptive thresholding method on LCU whose value of $d$ is greater than zero to extract the moving objects.

The global threshold value is not good in all the conditions where image has different lighting conditions in different areas. In that case, we go for adaptive thresholding.

Here we calculate the threshold for a small region of the image. So, we get different thresholds for different regions of the same image and it gives us better results for images with varying illumination.

**IV. Simulation and Results**

The proposed system can be viewed as an important step in moving forward towards having outperforming methods in the field of real-time multiple object detection and tracking. The main involvement in this system is the presence of a new architecture for processing images using background subtraction algorithm along with HEVC video compression technology gives robust to this project and which made this project more robust system which benefits from the combination between HEVC/H.265 video compression standard method and the detection and tracking techniques such as the background subtraction method and some morphological image processing. Using the parameters found in the system design, we tested our MATLAB software using real time HEVC videos with different instances for each image. Our software/CODE can detect objects with different orientation, scaling and transformation.

The below fig (4.1) contains three windows are listed below
- Original Video
- Binarized Difference video
- Tracking vehicle

![Fig. 3: Basic window developed by MAT Lab code](image-url)
V. CONCLUSION

Multiple Moving objects identification is based upon the information of HEVC standard compressed domain feature in which is Motion Intensity Count (MIC) which is extracted from compressed domain information of HEVC frames and the Motion vectors, coding unit and prediction unit are used to identify MIC. Then the vital role of concrete segmentation is carried by Adaptive thresholding to identify the moving objects. Here adaptive thresholding is applied only on the largest coding unit whose value of difference in MIC values is greater than zero, but not on entire frame, this is important where image has different lighting conditions in different areas and it will improve performance simply by applying Adaptive Otsu on specific LCU. This system will be useful for video surveillance applications for example like detecting severe traffic incidents online and make it
possible to warn traffic operators to take urgent action etc. Compared to other systems, the proposed approach allows the video streams to identify moving object in different approach i.e., by using MIC.

REFERENCES