Epitome Key Information Extraction Using Color Values on Block

Mie Mie Tin[1], Nyein Nyein Myo[2], Mie Mie Khin[1]
[1]Myanmar Institute of Information Technology, Myanmar
[2]University of Computer Studies, Mandalay, Myanmar
[1]miemietin1983@gmail.com, [2]vicky.mdy@gmail.com,
[1]miemie.khin9@gmail.com

Thi Thi Zin[3], Pyke Tin[3]
[3]University of Miyazaki, Miyazaki, Japan
thithi@cc.miyazaki-u.ac.jp
pyketin11@gmail.com

***Abstract*—In this paper, we propose block diagonal movement technique to classify shots on video frame sequence. Both RGB color pixel values and Hue value are employed in the proposed technique. Since Key frames are essential to analysis on large amount of video sequence databases this paper uses surveillance video files to extract some meaningful information key frames from long video sequences. This purpose is to reduce weak transaction frames in a large video stream by using block base approaches with diagonal movement. The experimental results show that RGB pixel value base approach is more suitable than HSV hue value base approach. In addition, it is learnt that RGB pixel value base method can extract key frames than HSV hue base with less processing times. RGB pixel values base diagonal block method can process accurately, clearly and stability to extract key information frames.**

***Keywords*— Key frame extraction, Block diagonal method, Color value**

I. INTRODUCTION

Information extraction like key frame extraction is also important for video files. Key information can represent on huge data. Key frame extraction has been recognized as one of the important research issues in video information retrieval [1]. Some researcher introduces a new block base algorithm for finding video shots and key frame extraction based on unsupervised clustering [2]. Key frame extraction is the fundamental step in any of the video retrieval applications [3]. In this paper, we will find out key frame selection using RGB pixel value and HSV value calculation block base approach for search transition frame. Our proposed algorithm is both computationally simple and able to solve for long frame sequence. HSV color model is deeply represented to clustered data point [4]. Objective of our system is to remove the redundant frames and select significant key frame from long video sequence. These key frames can support analysis of consideration object movement, motions and structure. Adaptive keys frames allow users to quickly browse meaningful information about the video by viewing only a few highlighted frames.

II. PROPOSED METHOD

In this system, input video file is converted to continuous frame sequences using video convertor. We consider first frame of that sequences as candidate key frame. We also divide every frame into non–overlap combination of eight by eight blocks. The blocks from candidate key frame are compared with adjacent blocks of other consideration frames. In comparison process between those blocks are candidate key frame and consequence frames, we move to diagonal movement technique. We compare between these blocks used two approaches with diagonal movement comparison technique.

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A. Diagonal Block Base

The system compares these block diagonally movement and summarize all value from blocks on a frame. Figure 1 shows block diagonal movement technique.

$$\text{frames difference values on block} = \sum_{i=1}^{n} \sum_{j=1}^{m} \left(x_{ij} - y_{ij}\right) \quad (1)$$

x_{ij}= value from block of candidate frame

y_{ij}= value from block of related other frame and n, m = 8

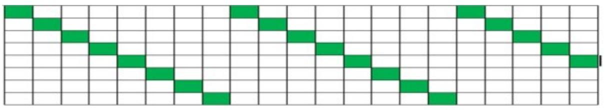


Fig. 1. Diagonal movement approaches base on blocks

B. RGB Color Model

To compare these blocks on RGB color values, system selects candidate key frame and divide into blocks. That also compares first black x, y from candidate key frame and related frames. Comparison case we move to next block x+8, y+8 by adding and compare until end of row and column. Finally, we summarize all difference results on a frame to a value and calculate frames difference values.

$$\text{frames difference values on RGB} = \sum_{i=1}^{k} \sum_{j=1}^{f} \left(x - y\right) \quad (2)$$

x= value from block of candidate frame

y= value from block of related other frame

k = (number of columns × 3) /f, f = row count

C. Hue Color Model

System considers hue values on HSV color. The first frame of input video frames sequences is divided into non-overlapping block of size 8×8 pixels. First frame is selected as candidate key frame. RGB color values are transformed to HSV values and summarize hue values for these blocks. Hue values from HSV color space are considered between ten bins and compare on each block. Frames difference values are classified base on their histogram values. These values differences can consider classifying strong transition shots and weak transaction shots.

$$\text{frames difference values on HSV} = \sum_{i=1}^{l} \sum_{j=1}^{m} (x - y) \quad (3)$$

x= value from block of candidate frame

y= value from block of related other frame

l = (number of columns - m) +1, m = row count

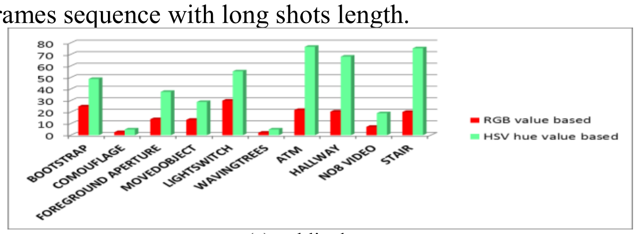
We consider three dimensional representations of the HSV color space and calculate hue dimension. Hue color type is considered base on ten bins. Our two approaches find out the two types transition shots. These are weak transaction shots and strong transaction shots. If weak traction shots have suitable shots length, two boundary frames and middle frame can be chosen as sample three key frames. The system calculates the value differences between these three key frames and the value differences is less than predefine threshold value, middle frame will be chosen as key information frame. Sometime, we get even number of shot length. Two middle frames become sample key frame. At that point, one middle frame will become key information frame.

For strong transition frames sequences, we calculate minimum-maximum algorithm to extract key information frame. That algorithm collects key information base maximum value difference and minimum value difference. That algorithm collects third key information frame from that shot. That approach can extract maximum, minimum, middle frames these two points. That three key information frames come from strong transition shot. To get stable and accurate key information, we use one value by adding the value of min-max approach values.

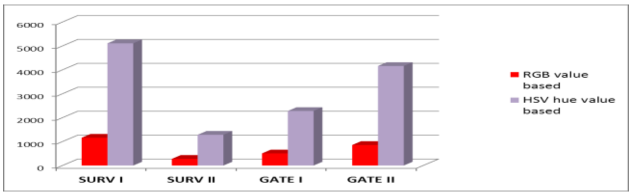
III. EXPERIMENTAL RESULT

We test on ten public datasets and four own datasets. Own dataset frame rates is 10 fps. From comparison of all results, we consider that RGB pixel value can reduce processing times. All approaches can find out accurate key frames.

Figure 2 (a) shows comparison result for processing time on international dataset and Figure 2(b) shows on own dataset. RGB pixel value approach can extract along object movement frames sequence with long shots length.



(a) public dataset



(b) own dataset

Fig. 2. Comparison results on processing times

In two approaches block base digonal movement method is used that can extract exact key information on shots. Table 1 shows key frame results from different datasets. The analysis of key frames can be considered that RGB color pixel value base results are extracted accurately. We calculate the accuracy of detect rate on object movement in transaction shots as shown in Figure 3. Pixel values on RGB based method can detect accurately and clearly object movement.

TABLE I. KEY INFORMATION FRAMES

Dataset	COMOUFLAGE	FOREGROUND APERTURE	MOVEDOBJECT	STAIR	SURV II	GATE I	GATE II
Pixel value base							
	Frame no.273	Frame no.932	Frame no. 748	Frame no. 335	Frame no. 888	Frame no. 90	Frame no. 870
HSV base							
	Frame no.279	Frame no.798	Frame no.886	Frame no.338	Frame no.884	Frame no.77	Frame no.865

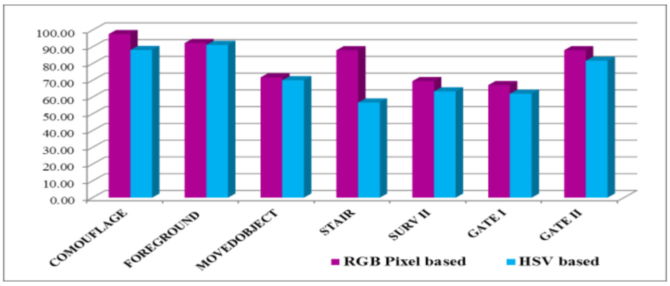


Fig. 3. Accuracy for transaction frames detect rates

IV. CONCLUSION

In this paper, it was found out that RGB color pixel value base approach is more suitable for key frame extraction. These key frames give accurate, correct and compact information by represent video information. This system had employed diagonal block base method along with diagonal movement technique. That can support less calculation and processing time than all block consideration. For further research we intend to investigate some problems of tracking region of moving objects from surveillance cameras network.

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