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.2018.4736

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

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

An Efficient Video Compression approach using Skin Tone Detection Technique based on Visual Perception of Human Eye

S. P. Victor[1], M. Venkatesh[2],
[1]*Associate Professor, St. Xavier's College, Tirunelveli*
[2]*Research Scholar, MS University, Tirunelveli*

Abstract*: *Video Compression technologies have found to hold a part by the way it is created, communicated and consuming visual information. Digital video communication plays an integral role in many applications such as broadcast services over satellite and terrestrial channels, wires, Digital video storage, wireless conversational services etc. Many video coding methods have been developed over the past decades for compression task. Most of the compression research done for commercial videos like's advertisements, songs, brand promotion videos. When we take a deep look into the commercial videos, it will be based on the objects/products or based on the performers. Performers based videos are taken for an instance. Obviously our human eye focuses on the performers instead of the other sections of the frame. In the case of commercial videos, the performers on the stage holds a major role and the other sections will be left less concentrated. So in our proposed system, the blocks of performers is been performed by the lossless compression. The remaining blocks of the frame is compressed by lossy compression.
Keywords: Skin Tone Detection, Partitioning the frames, Skin Tone Based HEVP Algorithm

I. INTRODUCTION

Under several characteristics, the video signals differ from image signals. The foremost important difference in that the video signals have a camera frame rate from 15 to 60 frames where the illusion of smooth motion in the displayed signal has been provided. Another difference between those signals is the ability exploits skin tones in designing compression methods for video. Skin detection is the process of finding regions in an image or video and skin-colored pixels. This is termed as a pre-processing step in order to find region that potentially have human skins in images. Skin image recognition is now widely used in a range of image processing applications such as skin disease detection, human-computer interaction and face recognition The skin color is the primary key for skin recognition of an image. Due to the variation in skin tone according to different races, color cannot be the only deciding factor. The light conditions may also affect the results. To overcome this factor, the image is broke down into individual pixels and it is classified into skin colored and non-skin colored. One simple method is by checking if each skin pixel falling into a defined color range or values in some coordinates of a color space.HSV color space is used to detect the skin bone in frames. Once finding the skin tone, the Huffman encoding will be performed on the skin tone blocks. Basically the videos are compressed by various algorithms which remove the same data. But in the case of commercial videos like advertisements, documentary films or songs, the performers repeatedly appear in the entire video not only on consecutive frames. Here, skin tones are the most common thing between frames. The repeated skin tones will not be considered in the existing methods. The Huffman encoding algorithm is applied on it, because normally human eye will be concentrating on the performers while playing video. So that the quality cannot be lost and bad quality feel cannot be given to the human eye. By doing this method, we can reduce the redundant data without losing the quality.

II. SYSTEM IMPLEMENTATION OF VIDEO COMPRESSION APPROACH

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

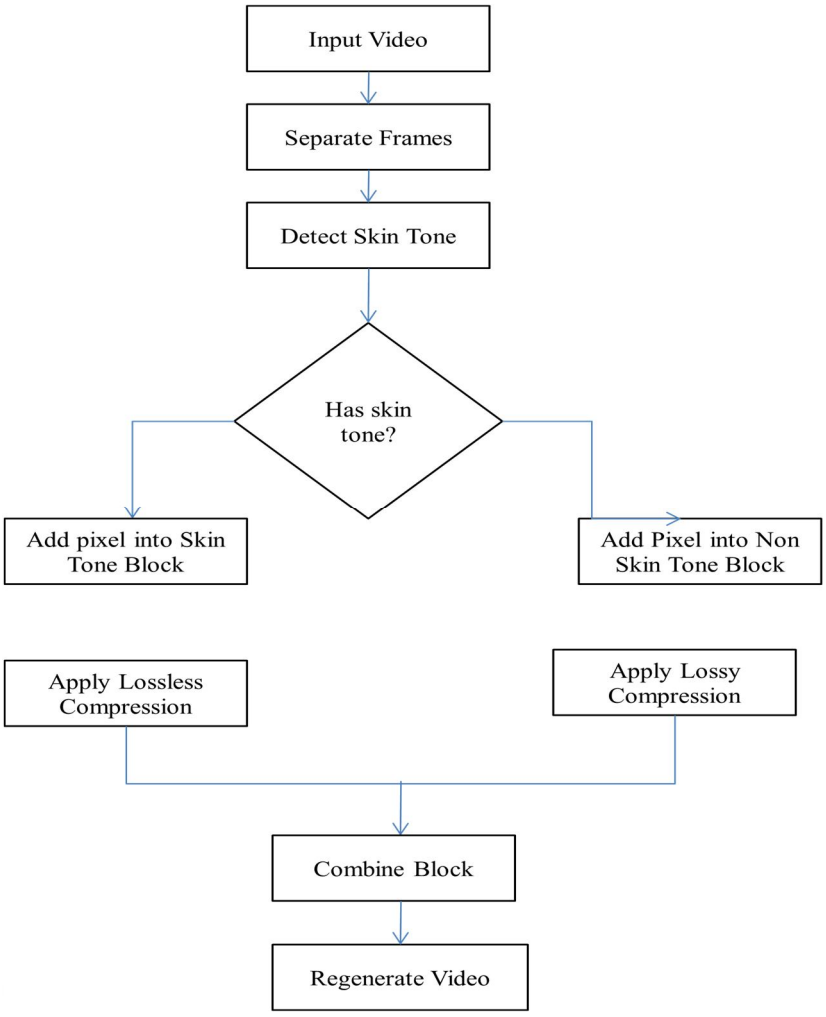


Fig 1: System implementation

III. SKIN TONE DETECTION

RGB may be the most commonly used one on the basis of color descriptions but it has the negative aspect that each of the coordinates (red, green and blue) subject to luminance effects from the lighting intensity of the environment, an aspect which does not necessarily provide relevant information about it whether a particular image "patch" is skin or not skin. However, the HSV color space is much more intuitive and provides color information in a manner more in line how humans think of colors and also how humans think of colors and also how artists typically mix colors.

'Hue' – The basic pure color of the image.

'Saturation' – The manner by which this pure color (hue) is diluted by white light.

'Value'- An achromatic motion of intensity of the color.

A Skin color value is concentrated in a small scope and it usually has a certain range of values. The skin color is detected by the system that uses the normalization r, g, b value from every obtainable color component and is then detected by using the formula:

$$r = \frac{R}{I} \qquad g = \frac{G}{I} \qquad b = \frac{B}{I} \qquad \text{---------- (1)}$$

Where

I= R + G + B

r, g, b = normalized color of red, green and blue respectively where r + g + b = 1

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

After that, the analysis process is carried out in HSV (Hue, Saturation and value) format. To convert the RGB color model into HSV color model, the following equation is used

$$H1 = \cos^{-1}\left\{\frac{0.5[(R-G)+(R-B)]}{\sqrt{(R-G)^2+(R-B)(R-B)}}\right\},$$

$$H = \begin{Bmatrix} \text{H1}, & \text{if } \text{B} \le \text{G} \\ 360^\circ - \text{H1}, & \text{if } \text{B} > \text{G} \end{Bmatrix} \qquad \text{---------- (2)}$$

$$\text{S} = \frac{\text{Max(R, G, B)} - \text{Min(R, G, B)}}{\text{Max(R, G, B)}}$$

$$V = \frac{Max(R,G,B)}{255}$$

From the analysis result, the two color model is combined to determine whether a part of a frame includes skin color or not. Acceptable boundaries for human skin color is used in this method as follows

$$0.36 \le r \le 0.465, \quad 0.28 \le g \le 0.363,$$

$$0 \le H \le 50, \quad 0.20 \le S \le 0.68, \quad 0.35 \le V \le 1.0 \qquad \text{---------- (3)}$$

Once the pixels are found to in the acceptable boundaries, the pixel value has been converted into a binary data for Huffman compression.

IV. LOSSY AND LOSSLESS COMPRESSION IN SINGLE FRAME

According to the proposed method, the lossy compression and lossless compression can be performed inside a single frame. As the skin tone patch is the human's eye focusing patch, the lossless compression is applied on that patch. The same way, non-skin tone patch will not be the human's eye focusing patch. And therefore the lossy compression is applied to that particular patch. The byte pair encoding algorithm is used to perform the lossy compression.

V. SKIN TONE BASED HEVP ALGORITHM

```
n = no of frames
m1 = width of frame
n1= height of frame
h=mean value of frame
for i=1:m1
      for j=1:n1
          Calculate HSV
          if (0 < H(i, j)< 50) && (0.20 < S(i, j)< 0.68) && (0.35 < V(i, j)< 1.0)
                    new_image(i, j) = 1
         end
      end
   end
end
window_size = math.round(h/2)
For m = 1 to areasize
          For n = 1 to window_size
                    patch = (new_image (m:m+ window_size -1, n:n+ window_size -1,1:3)
                    if(all(patch)) then
                              apply lossless compression algorithm
                    else
                              apply lossy compression algorithm
```

end

end

end

VI. EXPERIMENTAL RESULTS AND DISCUSSION

Our skin tone based HEVP algorithm has been tested for five video sequences in order to measure the performance of the proposed system. It is measure of in terms of PSNR and percentage of saving number of the computations of video compression. The algorithms are found to be executed in a single machine to verify the efficiency of the proposed method. Lossy compression and lossless compression is compared with the performance of skin tone based HVP algorithm. The following table shows the results of the existing lossy and lossless compression methods PSNR gain ratio and our proposed algorithm's gain ratio for the same video.

TABLE I
PSNR Gain Ratio by HEVP algorithm over Existing Methods

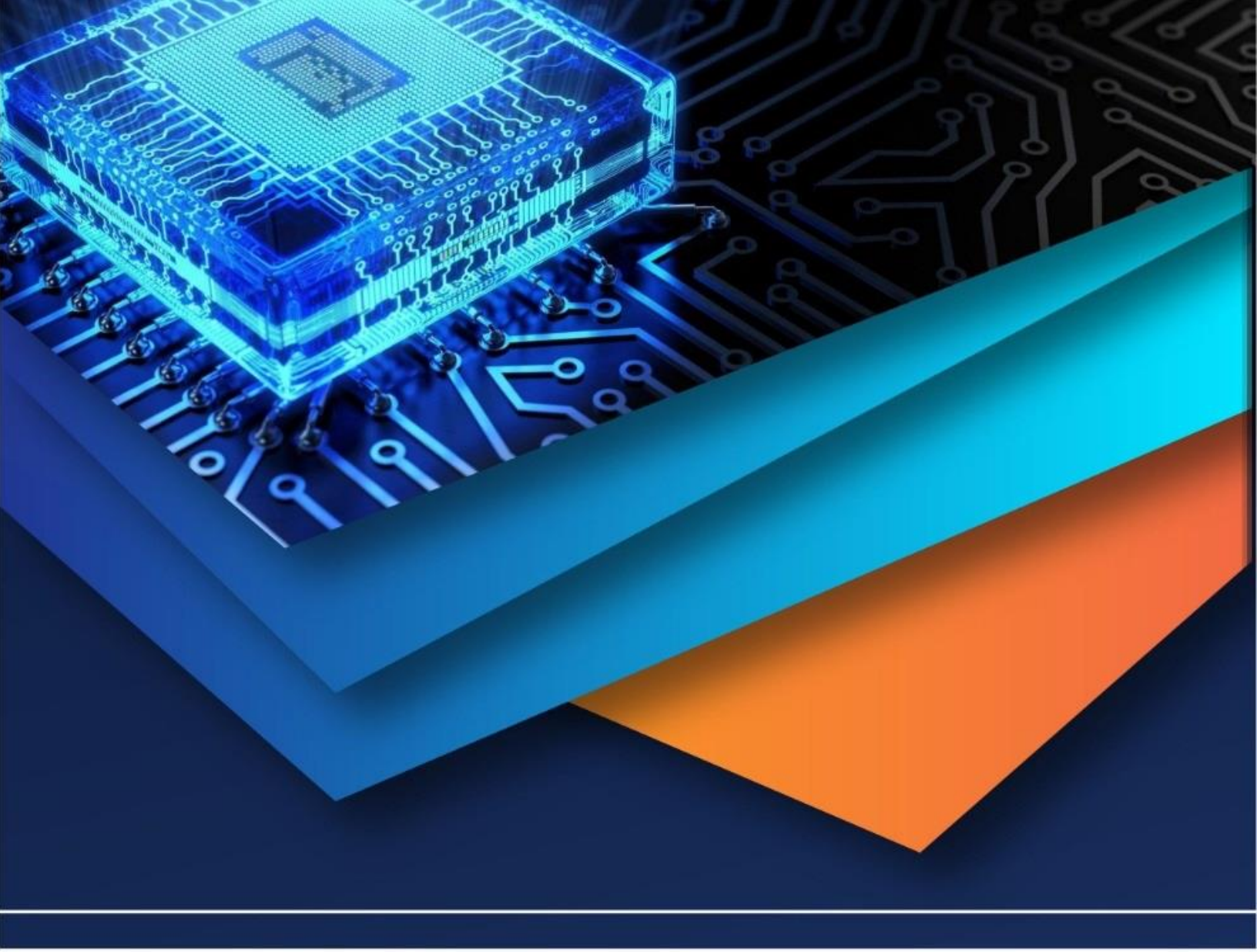
Sequence	Lossy Compression	Lossless Compression	Skin Tone Based HEVP
Video1	11.4334	38.0302	43.9493
Video2	12.3939	39.0202	41.0848
Video3	10.0338	36.39321	42.83752
Video4	14.4543	39.93382	43.42322
Video5	11.6453	38.6865	41.7653

VII. CONCLUSION

An Efficient Video Compression approach using Skin Tone Detection Technique based on Visual Perception of Human Eye is developed based on skin tone detection which is been concentrated on the calculation of skin tone. The human eye would get a feel of watching a high quality video even after the compression. Different types of commercial video are introduced to test the system and the resultant compressed video will be found to have a good quality and good performance. It is also found to have specific compression rate. The MSU Video Quality Measurement Tool is used for calculating PSNR value.

REFERENCES

[1] Mennatallah M. Sadek, Amal S. Khalifa, Mostafa G. M. Mostafa, "Robust video steganography algorithm using adaptive skin-tone detection", Springer, January 2017, Volume 76, Issue 2, pp 3065–3085
[2] Abbas Cheddad, JoanCondell, Kevin Curran, Paul Mc Kevitt, "A skin tone detection algorithm for an adaptive approach to steganography", Elsevier Volume 89, Issue 12, December 2009, Page 2465-2478
[3] M. Shemshaki and R. Amjadifard. Face Detection Based on Fuzzy Granulation and Skin Color Segmentation. In Proc. Of CICSYN, 219224,2011
[4] J.P. Vink, T. Gritti, Y.Hu and G.DeHaan. Robust skin detection using multi-spectral illumination. In Proc. Of FG, 448-455, 2011
[5] A.Cheddad, J.V. Condell, K.J. Curran, and P. McKevitt. Anew colour space for skin tone detection. InProc. Of IEEE ICIP, 7-11,200
[6] Khamar BashaShaika, P.Ganesana, V.Kalista, B.S.SathishaJ. Merlin MaryJenithab, "Comparative Study of Skin Color Detection and Segmentation in HSV and YCbCr Color Space",Elsevier Volume 57, 2017, Pages 41-48
[7] Ramadhan J. Mstafa, Khaled M. Elleithy, A video steganography algorithm based on Kanade-Lucas-Tomasi tracking algorithm and error correcting codes, Springer, September 2016, Volume 75, Issue 17, pp 10311–1033
[8] Ramadhan J. Mstafa, Khaled M. Elleithy, A New Video Steganography Algorithm Based on the Multiple Object Tracking and Hamming Codes, IEEE Xplore, March 2016
[9] Patil, Prajakta M., and Y. M. Patil, "Robust Skin Colour Detection and Tracking Algorithm", Interna-tional Journal of Engineering Research and Technology Vol. 1. No.8 (October-2012), ISSN: 2278-0181 (2012
[10] Sandeep, K and Rajagopalan, A.N, "Human Face Detection in Cluttered Color Images Using Skin Color and Edge Information", ICVGIP, 2016



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY