Analyzing the Video Parameters Hue, Saturation, Gamma and Sharpen Before and After Transcoding

S.Jensy Mary
Assistant Professor, PG & Research Department of Computer Science,
St.Joseph's College of Arts & Science (Autonomous), Cuddalore, Tamilnadu

Abstract- **In this paper the video file size is analyzed by changing the video parameters Hue, Saturation, Gamma and Sharpen, by using the VLC Media Player. Various values preferred by the various users are assigned to the video parameters Hue, Saturation, Gamma and Sharpen to the original video and then it is converted and saved. Finally the converted video is transcoded to various systems with the help of the local network. The file size of the original video and the transcoded video is analyzed. Therefore the main aim is to reduce the video file size according to the users preferences by changing the video parameters Hue, Saturation, Gamma, and Sharpen, in order to reduce the amount of pre-buffering required to ensure a maximum video continuity during transcoding as well as also for streaming.**

Index Terms- **Gamma, Hue, Pre-buffering, Saturation, Sharpen, Streaming, Transcoding**

I. INTRODUCTION

The vast development in variety of Networks and end systems poses an impeccable challenge in communication. This challenge becomes more of a risky challenge when multimedia data are transmitted. The QoS of Multimedia Streaming Applications becomes a very big issue considering the dynamic nature of *network characteristics, end system equipment and user's preferences.* In traditional Multicasting, Multimedia streams are transmitted at the same rate and resolution to all receivers independent of the network characteristics, end system equipment and user's preferences [1]. Such an Approach results in resources being wasted and many also result in receivers having their quality expectations unsatisfied. These problems can be addressed by different Adaptive solutions. This paper makes a complete study on the above mentioned methods and proposes a new approach by changing the video parameters Hue, Saturation, Gamma, Sharpen by using the VLC Media Player, according to the users preference inorder to reduce the file size. Due to the reduction in file size , transcoding as well as streaming of multimedia data are transmitted faster, also it reduce the amount of pre-buffering required to ensure a maximum video continuity.

To know the users preference, a study is made by collecting the data related to video parameters from 514 students by playing the video in the VLC media player. After collecting all the data, mostly preferred value by the users are selected and the video is changed according to the user preference. The converted video is transcoded to various systems. The media information of the different system is noted to know the reduction in file size.

The remainder of this paper is organized as follows. Section 2 provides related work, Section 3 overviews Color Parameters, Section 4 presents a brief discussion of the use of video transcoding, and Section 5 shows the results. Finally, the paper concludes in Section 6 and discusses some directions for future work.

1. Related Work

The usability of devices and services has been studied for a long time, but attention to user experience and QoE is more recent. During the 1980s and 1990s most user-centered work focused on the usability of information and communication technology (ICT). Since 1998 usability has been defined by the International Standards Organization (ISO 9241, p. 2)[2], as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. In recent years the use of ICT has extended from the workplace to the home and for applications that support leisure and social activities in addition to work. Consequently, the concerns of human-computer interaction have evolved from a focus on effectiveness and efficiency to user experience factors such as enjoyment,

engagement and the appeal of using and owning ICT, e.g. [3].

The technology-centered approach mainly emphasizes the concept of QoS and has its strongest reference from the ITU (International Telecommunications Union). The ITU Recommendation [4] is the key reference and states that QoS is the: "Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service." [4]. although the ITU definition refers to user satisfaction, QoS is mainly used by technicians to define technical parameters of telecommunication applications such as network delay and packet loss. In addition, a focus on user satisfaction is rather limited because it is only one of many measures of user behavior with a communication service.

The Quality of Experience (QoE) approach is concerned with understanding the outcomes of people's use of ICT. The majority of work to date on QoE has concerned subjective measurement of experience and QoE is typically defined in terms of user satisfaction [5]. A QoE measure therefore needs to be stated together with the technical conditions of a communication service if it is to be useful for stakeholders. Consequently, QoE should be expressed in QoS terms [6] and [7]. In recognition of this, ETSI (the European Telecommunications Standards Institute) has provided the definition supported in this report. It is argued that the focus should be on how end-users experience a specific service, terminal or network. This report proposes a way to measure QoE and derive a body of QoE data as guidelines. The approach described enables comparing one service delivered with different Quality of Service parameters to see which QoS-level is good enough.

2. Color parameters

Hue, saturation, and brightness are aspects of color in the red, green, and blue (RGB) scheme. These terms are most often used in reference to the color of each pixel in a cathode ray tube (CRT) display. All possible colors can be specified according to hue, saturation, and brightness (also called brilliance), just as colors can be represented in terms of the R, G, and B components. Most sources of visible light contain energy over a band of wavelengths [8].

- Contrast <float> Image contrast in the 0-2 range.
- Brightness <float> Image brightness in the 0-2 range.
- hue <integer> Image hue in the 0-360 range
- Saturation <float> Image saturation in the 0-3 range.
- Gamma <float> Image gamma in the 0-10 range.
- Sharpen<float> Image Sharpen in the 0-2 range

3.1 Analyzing the Image parameter

In this paper, the image parameter which is taken for the analysis are Hue, Saturation, Gamma, and Sharpen. According to the end user preferences the values of hue, saturation, gamma and sharpen are changed to analyze whether the file size of the video will be reduced according to the values. Before going detail into the analysis, let see what is actually the image parameter hue, saturation, gamma, sharpen stands for. Also how to change the values in the VLC media player and how the image gets changed with the different values.

3.1a. Hue

The hue of a color identifies what is commonly called "color",for example , all reds have a similar hue value whether they are light, dark, intense, or pastel. Color is one of the most powerful of elements. It has tremendous expressive qualities. Understanding the uses of color is crucial to effective composition in design and the fine arts [9].

The word color is the general term which applies to the whole subject - red, orange, yellow, green, blue, violet, black and white and all possible combinations therefore. Hue is the correct word to use to refer to just the pure spectrum colors. Any given color can be described in terms of its value and hue. Hue is the term for the pure spectrum colors commonly referred to by the "color names" - red, orange, yellow, blue, green violet - which appear in the hue circle or rainbow.

3.1b. Value and Hue

Value is defined as the relative lightness or darkness of a color. It is an important tool for the designer/artist, in the way that it defines form and creates spatial illusions. Contrast of value separates objects in space, while gradation of value suggests mass and contour of a contiguous surface [10]. In VLC Media Player Hue values ranges from 0 to 360. The Fig 3.1 shows an Image with various Hue values and how it looks.

Fig 3.1: An Image with various hue values.

3.1b. Saturation

The term saturation comes into play when measuring the amount of color being reflected. If an object absorbs every color except blue, for instance, then that blue is considered to be highly saturated. If, however, the object absorbs some of the blue along with everything else, then the blue is less saturated [11].

The saturation of a color is determined by a combination of light intensity and how much it is distributed across the spectrum of different wavelengths. The purest (most saturated) color is achieved by using just one wavelength at a high intensity, such as in laser light. If the intensity drops, then as a result the saturation drops. Fig 3.2 shows an image with various saturation value.

Fig 3.2: An Image with various Saturation Value.

3.1 c. Gamma

Gamma can be described as the measurement of contrast that affects the midtones of an image. A gamma measurement can apply to several elements within the computer system. The cathode ray tube (CRT) in the monitor, the hardware looks up table (LUT), the overall output. Generally, gamma measurements will range from 1.0 to 3.0. Different systems will have different gamma measurements [12]. Fig 3.3 shows an image with various gamma values.

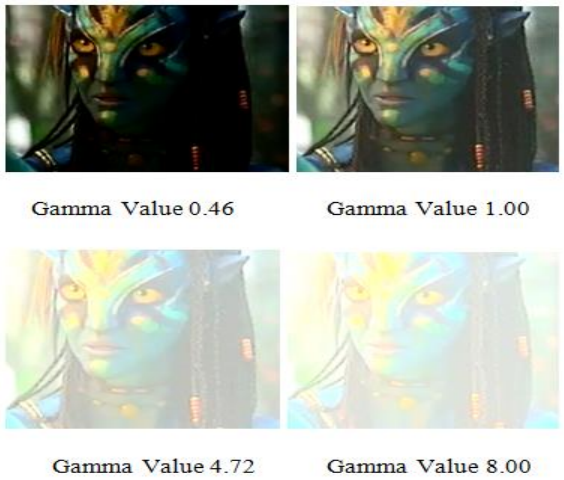

Fig 3.3: An Image with various Gamma Value.

3.1d. Sharpening

Sharpening is one of the most impressive transformations can apply to an image since it seems to bring out image detail that was not there before. The Sharpen filter accentuates edges but also any noise or blemish and it may create noise in graduated color areas like the sky or a water surface. It competes with the Unsharp Mask filter, which is more sophisticated and renders more natural results [13].

When progressively sharpen a slightly blurry image, it first starts to look better, but then as begin to over sharpen it, it starts to look worse again. Fig 3.4 shows an image with various sharpen value

Sharpen Value 0.72 Sharpen Value 1.80

Fig 1.8: An Image with various Sharpen Value

4. Video Transcoding

Transcoding is the process of taking a video file and changing it to a different format or bitrate. In VLC, transcoding is exactly the same as streaming across a network, except that the output is sent to a file instead of a network[14]. Transcoding is the process of converting one from of video to another in the compression domain. The original video may high frame rate, high resolution and other characteristics typical of high quality video. It may not be possible to stream uninterrupted video in this format in a congested situation. However, it is possible to stream the multimedia content with different video parameters using transcoding where the video information is scaled down [15].

After changing the values of the video parameters Hue, Saturation, Gamma, and Sharpen according to the users preference the converted video is transcoded to different system. By changing the parameters value the converted video file size is reduced very much, also the video is transmitted very fast over network than the normal video. Therefore the QoE of the users watching over network will be good, also the user will provided with better QoS.

5. Results

The following charts show the no of users and their preferred value of selecting the video parameters. From all the users value the majority of the user preferred value is taken consider. Using those values the video is converted and transcoded. The converted video is also considerably reduced.

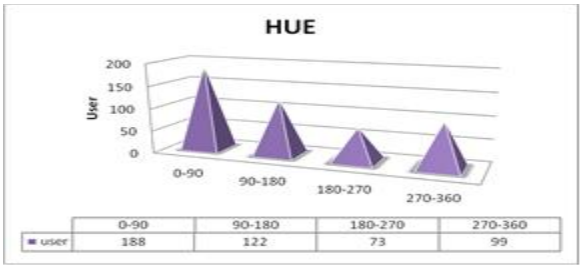

Chart 5.1: Hue Value Selected by the user

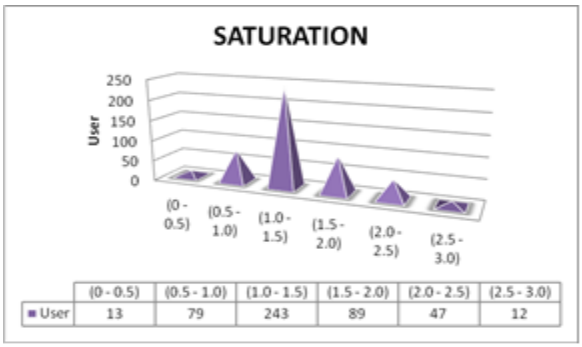

Chart 5.2: Saturation Value Selected by the user

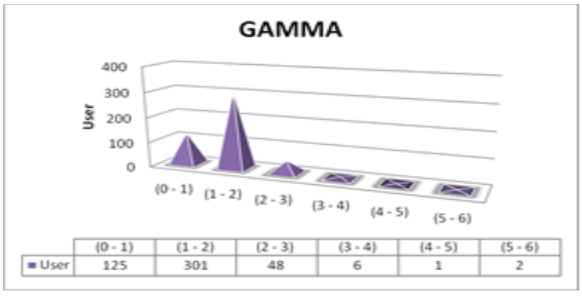

Chart 5.3: Gamma Value Selected by the user

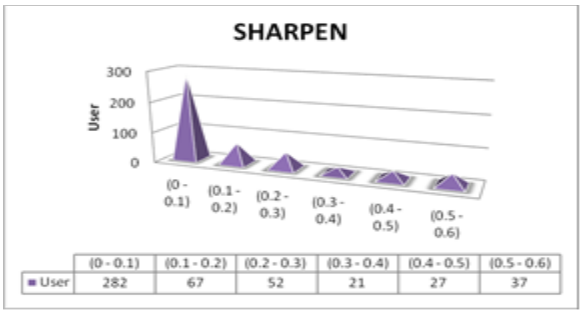

Chart 5.4: Sharpen Value Selected by the user

USER SELECTED VALUES				
Hue	0	180	360	
Saturation	1.02	1.36	1.28	1.37
Gamma	1.23	1.43	1.29	1.46
Sharpen	0.2	0.09	0.15	0.08
TRANSCODED SIZE in MB				
Hue	85.2	85.2	85.2	
Saturation	85.4	87.6	87.1	87.7
Gamma	86.0	85.6	85.9	85.6
Sharpen	127	102	115	100

Table 5.1: Transcoded file size

The original video file size is 142 MB. The above table 5.1 shows the reduced file size of the converted video with the user preferred parameter values.

6. CONCLUSION

The main finding of this research is reduction of file size by changing the parameters according to the user preferences. Due to the reduction in file size the transcoding of the video from one system to another system will be faster. Reduction in file size also affects the quality of the video, but the quality of the video will be preferred by the users. Hence the QoE of the end users increases after transcoding.

In future work, after reducing the file size by changing the parameters. The converted video is streamed over networks. Due to the reduction in size the streaming will be faster as well as buffering will be reduced. Further research work can be carried out to analyse that there is any relationship between the user's type and video quality they prefer to watch over network via streaming. So that when the user watch the video via streaming, they can simply select the user type they can view the video according to their preferences. Also depending upon the content of the video which they are watching.

REFERENCES

[1] L. Chen and G. Singh, "Enhancing multicast communication to support protocol design," in Proceedings of the 11th International Conference on Computer Communications and Networks (ICCCN '02), pp. 328–333, Miami, Fla, USA, October 2002.

[2] McGurk, H., & McDonald, J. (1976): "Hearing lips and seeing voices", Nature 264, 746-748.

[3] Bruce, V. (1996): "The role of the face in communication: Implications for videophone design", Interacting with Computers, 8(2), 166-176.

[4] Nokia (2004): "Quality of Experience (QoE) of mobile services: Can it be measured and improved?" White Paper, Nokia Corporation.

[5] Multimedia Hardware Requirements, http://eyckud.ii.metu.edu.tr (accessed June 10, 2012).

[6] ISO 9241-11 (1998): "Ergonomic requirements for office work with visual display terminals (VDTs) Part 11: Guidance on usability".

[7] Hestnes, B., Brooks, P., Heiestad, S., Ulseth, T., Aaby., C. (2003): "Quality of Experience in realtime person-person communication - User based QoS expressed in technical network QoS terms", Proceedings of the 19th International Symposium on Human Factors in Telecommunication, Berlin, Germany, December 1-4 2003, pp. 3-10.

[8] Kelly Wearstler, Hue(Limited Edition): Ranges In Hue; AMMO Books,LLC: Los Angeles, 2010, pp 19-22.

[9] Sharpen Effects, http://docs.gimp.org (accessed April 17, 2012).

[10] Johannes Ltten, The Elements of Color: Color Variety; John Wiley & Sons: Canada, 2003, 36-37.

[11] Gamma Transfer Effect, http:// msdn.microsoft.com (accessed May 30, 2012)

[12] Images Effects Using Hue Saturation,http://www.webdesign.org (accessed April 5, 2012).

[13] Saturation Effects, http:// msdn.microsoft.com (accessed May 3, 2012).

[14] Xuemin Chen, Digital Video Transcoding For Transmission And Storage: Transcoding; Taylor& Francis: UK, 2004, 80-102.

[15] Katashi Nagao, Digital Content Annotation And Transcoding: Video Transcoding; Artech House Publishers: London, 2003, 19-21.