ISSN (Online) : 2278-1021
ISSN (Print) : 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 3, Issue 3, March 2014

An Analysis on Colorization-Based Compression Techniques

Ms. Deepu R [1], Mrs. Vedavathi S[2], Mrs. A Shobha Rani [3]

IVth Semester, M.Tech, Department of ECE, Acharya Institute of Technology,

Bangalore, India[1,2]

Associate Professor, Department of ECE, Acharya Institute of Technology,

Bangalore, India[3]

Abstract: In colorization-based coding the encoder picks a couple of representative pixels (RP) for which the chrominance values and the positions are sent to the decoder, although in the decoder, the chrominance values for all the pixels are recreated by colorization techniques. The fundamental issue in colorization-based coding is the manner by which to obtain the RP well in this manner the compression rate and the nature of the reproduced color image gets to be good. However, past studies on colorization-based coding obtain excess representative pixels and don't remove the pixels needed for suppressing coding errors. In this paper, an analysis on different colorization-based coding methods is done.

Keywords: Chrominance value, Compression rate, Colorization, Image Compression, Luminance value, Representative Pixels (RP).

I. INTRODUCTION

Colorization based compression is a method to compress a color image preserving its color components and reconstructing the color image. In colorization based coding few representative pixels are extracted which provides the color information for all the other pixels in the image. Recently, a novel approach to color image compression based on colorization has been presented. The conventional method [1] segments clusters of chrominance components of an input color image and assigns colors to the clusters at the encoder. The chrominance components are propagated from the color assignation by a colorization technique at the decoder. As of late, another Compression technique for color images, which is dependent upon the utilization of colorization strategies, has been proposed [1]–[4]. Long ago, a few colorization techniques [5] have been proposed to colorize grayscale images utilizing just a couple of representative pixels (RP) given by the user. The principle assignment in colorization based compression is to immediately remove these few RP in the encoder. At the end of the day, the encoder chooses the pixels needed for the colorization process, which are called representative pixels (RP) in [4], and looks after the color data just for these RP.

The position vectors and the chrominance values are sent to the decoder just for the RP set together with the luminance channel, which is compressed by conventional compression techniques. At that point, the decoder restores the color data for the remaining pixels utilizing colorization techniques. The fundamental issue in colorization based coding is the way to obtain the RP set with the goal that the Compression rate and the quality of the restored color image gets good. A few strategies have been proposed to this end [1]–[4]. All these strategies take an iterative methodology. In these strategies, in the first place, an irregular set of RP is chosen. At that point, a provisional color image is remade utilizing the RP set, and the nature of the remade color image is assessed by contrasting it with the first color image. Additional RP are obtained from areas where the quality does not fulfill a certain rule utilizing RP extraction systems, while redundant RP are diminished utilizing RP reduction methods. However, the set of RP may in any case hold repetitive pixels or some needed pixels may be missed. The fundamental concept of colorization based coding is the extraction of the RP. Past colorization based coding techniques utilize an iterative methodology to obtain the RP. In these methodologies, initially, a random set of RP is generally chosen. This random choice is manual and causes a repetitive or deficient set of RP. Accordingly, repetitive RP must be disposed of, and needed RP must be added by extra RP end/ extraction methods. In [1] and [2], new pixels are added to the starting set of RP by iterative choice dependent upon machine learning, while in [3], the RP is chosen iteratively compelled to a set of color line segments. In [4], repetitive RP are diminished and needed RP are obtained iteratively dependent upon the qualities of the colorization groundwork. Even after using these extra RP extraction/reduction methods, it is still not ensured that the coming about set of RP is ideal.

II. EXISTING METHODOLGY

In [5], Levin et al's propose a colorization algorithm, which reproduces the colors in the decoder utilizing the color data for just a couple of representative pixels (RP) and the gray image which holds the luminance data. For instance, utilizing the Ycbcr color space, the colorization issue reproduces all the Cb and Cr parts, given the Y luminance segment and the Cb and Cr data for a couple of RP. Emulating the documentation in [4], we signified y as the luminance vector, u as the result vector, i.e., the vector holding the color parts to be remade in the decoder, and x

ISSN (Online) : 2278-1021
ISSN (Print) : 2319-5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 3, Issue 3, March 2014

as the vector which holds the color qualities just at the positions of the RP, and zeros at alternate positions. The vectors y, u, and x are all in raster-scan order. The cost function characterized by Levin et al. is : $u = A^{-1}x$.

In [1], colorization-based coding uses an active learning methodology to obtain RP automatically. Their strategy performs superior to JPEG for color components. The steps of the strategy are given underneath.

(i) Segment input image into clusters by image segmentation algorithm.
(ii) Obtain RP arbitrarily from each cluster.
(iii) Perform colorization by utilizing temporary RP.
(iv) Find out the clusters that have high error between input image and colorized images.
(v) Obtain more RP from high-error clusters.
(vi) Repeat 4–5.

In [4], another colorization-based coding strategy is shown. In past strategies, there is a high probability of obtaining repetitive RP when setting the introductory RP. This methodology decreases the repetition of the introductory RP. On the other hand, if the starting RP don't incorporate pixels needed for suppressing coding errors, such pixels cannot be obtained by just the redundancy reduction process. The method is as follows:

(i) Obtaining initial RP.
(ii) Lessening redundancy of RP.
(iii) Extraction of needed pixels for RP.

In [3], RP is extracted as a set of color line segments. By limiting the RP to a set of color line segments, the amount of data for representing RP is decreased radically while subjective quality is retained. Then again, this method is not assessed with any objective quality metric. Despite the fact that this technique for colorization-based coding outflanks JPEG as far as subjective quality, the decoded chrominance parts lose the local oscillations that the input image had. An extensive number of color assignations are needed to restore these oscillations.

III. CONCLUSION

The main issue in colorization based coding is to extract the RP set well therefore to meet the quality of the original color image. The colorization based compression techniques mentioned in the paper extract the representative pixels in iterations. If the needed pixels are missed which satisfy the original input image quality then they are added to the RP set by some extraction/reduction methods. Further work can be done on reducing the iterations to extract the RP, improving the quality of the image and the compression rate by extracting minimal set of RP that satisfy the quality of the input color image.

REFERENCES

[1] L. Cheng and S. V. N. Vishwanathan, “Learning to compress images and videos,” in Proc. Int. Conf. Mach. Learn., vol. 227. 2007, pp. 161–168.
[2] X. He, M. Ji, and H. Bao: “A Unified Active and Semi-supervised Learning Framework for Image Compression,” IEEE CVPR2009, pp. 65–72, Jun. 2009
[3] T. Miyata, Y. Komiyama, Y. Inazumi, and Y. Sakai, “Novel inverse colorization for image compression,” in Proc. Picture Coding Symp., 2009, pp. 1–4.
[4] S. Ono, T. Miyata, and Y. Sakai, “Colorization-based coding by focusing on characteristics of colorization bases,” in Proc. Picture Coding Symp. Dec. 2010, pp. 230–233.
[5] A. Levin, D. Lischinski, and Y.Weiss, “Colorization using optimization,” ACM Trans. Graph., vol. 23, no. 3, pp. 689–694, Aug. 2004.