AN ANALYTICAL STUDY OF 3D IMAGE COMPRESSION TECHNIQUES FOR STEREOSCOPIC IMAGES IN VIRTUAL REALITY WORLD

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Abstract :

Virtual Reality (VR) and Augmented Reality (AR) Head-Mounted Displays (HMDs) have been rising in the most recent years and they are picking up an expanded prevalence in numerous ventures. HMDs are commonly utilized in stimulation, social collaboration, instruction, however their utilization for work is likewise expanding in spaces, for example, drug, displaying and recreation. In spite of the ongoing arrival of numerous sorts of HMDs, two noteworthy issues are upsetting their boundless reception in the standard market: the amazingly mind-boggling expenses and the client experience issues [1]. The hallucination of a 3D show in HMDs is accomplished with a method called stereoscopy . Uses of stereoscopic envisioning are with the end goal that information move rates and– in versatile applications– stockpiling rapidly turn into a bottleneck. The issue is that the misfortune in lossy picture pressure may obscure the moment contrasts between the left-eye and right-eye pictures that are significant in setting up the figment of 3D discernment. Nonetheless, so as to accomplish progressively productive coding, there are different coding strategies that can be adjusted to stereoscopic pictures. Stereo picture pressure strategies that can be found in the writing use discrete Wavelet change and the morphological pressure calculation connected to the change coefficients.

Keywords:
image compression, stereoscopic, wavelets, head mounted display.

I. INTRODUCTION

Stereoscopy/stereovision is a system for building a hallucination of picture profundity which depends on the wonder of stereopsis (binocular profundity recognition) base on the distinction between the pictures that we see with the left and right eye, Figure 1. These are the alleged sets of stereoscopic pictures [2, 3]. The pictures contain huge measures of information, and the cost of additional authenticity in stereo showcases is the multiplying of information (because of the synchronous presence of two pictures), causing a bottleneck in the information stream 3D picture is acquired just with the utilization of equipment or displays for watching stereoscopic symbolism so 3D data isn't recorded aside from by suggestion in the distinction between the two picture. The technical limitations of this sort of display mean that the refresh rate of the display should be synchronized with the glasses used which may be done wirelessly as well. It is known that because of its imperfections, the human eye cannot distinguish the entire color gamut available on modern displays. The ques- tion arises, therefore, whether it makes sense to keep all these shades of color if the human eye is not able to see them. In addition, there are also redundancies in image content, especially in the case of frames of video. Due to limitations in data transfer, online load, and synchronization, compression is a key component in modern communication and data communication services.

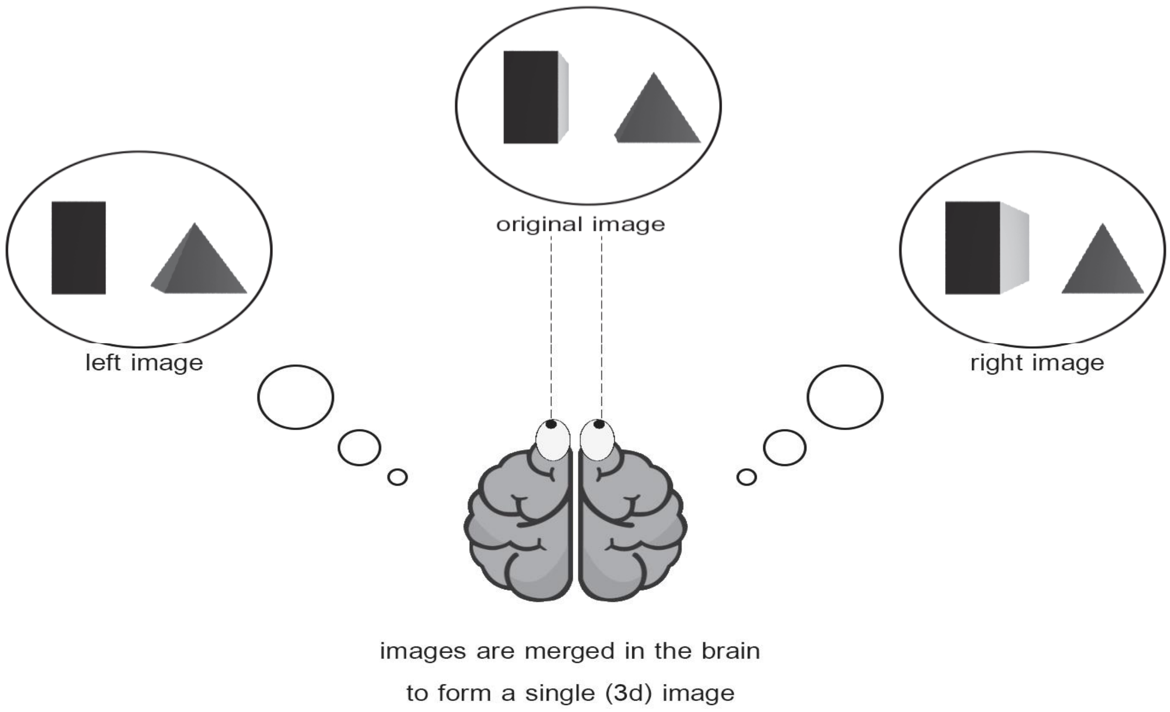


Fig. 1. Demonstration of how a pair of stereo images creates an illusion of 3D scene/objects

There are various standard picture pressure procedures such as, JPEG [4] and MPEG [5, 6]. Standard picture pressure methods can't build up relationships between's the left and right stereo sets and the data they contain. On account of standard pressure methods, it is important to pack each picture of a stereo pair independently, which would prompt multiplying of the transfer speed in information transmission[7,8] Because of the discrete contrasts that happen between the uncompressed and compacted pictures, the dream is possibly upset, as the essential moment contrasts between pictures might be disturbed and there is no arrangement in standard picture pressure procedures to safeguard them. Because of the absence of standard pressure systems, devoted methods for the pressure of stereoscopic pictures are created. The pressure methods of stereo pictures found in the writing utilize discrete wavelet change and morphological pressure calculation. The wavelet idea of the calculation and the proposed divergence pay give recreated pictures without blocking ancient rarities and less irritating ringing impacts.

One fundamental focal point of research in stereo picture coding has been difference estimation, a procedure used to diminish the coding rate by exploiting the excess in a stereo picture pair. These are the reasons why the examined pressure strategies are noteworthy and emerge from measures pressure systems, for example, MPEG, JPEG and JPEG-200 [5]. Likewise, huge numbers of the pressure methods proposed over the time are exclusive and in that capacity are not actually accessible. Along these lines, we chose to confine our examination on the ones whose source codes, executables, as well as results were accessible to us. It is our goal to grow our examination and to actualize more pressure methods proposed for stereoscopic imaging.

II. VIDEO COMPRESSION

Video and sound records can devour huge measure of information and need high measure of capacity. Vast information needs high data transfer capacity arranges in transmission. That is the reason information are compacted. Video pressure alludes to lessening the amount of information used to speak to video pictures. Recordings are packed so as to successfully decrease the required transfer speed in transmitting advanced video by means of earthbound communicate, links/wires/fiber optics, or by means of satellite administration. Video pressure diminished the measure of information transmitted without lessening its quality. It is at the core of advanced TV top boxes, DVD players, video conferencing, Internet video, and different applications. These applications profit by video pressure in the way that they may require less storage room for filed video data, less transfer speed for the transmission of the video data starting with one point then onto the next or a mix of both.

III. WAVELET IMAGE COMPRESSION

A wavelet is a scientific capacity utilized for advanced flag handling and picture pressure. In flag handling, wavelets are utilized to recuperate feeble signs from commotion. It is likewise valuable for X-beam and attractive reverberation imaging in therapeutic applications. In web correspondence, it is utilized to pack pictures on a bigger scale. Wavelet pressure works by breaking down and changing over a picture into a lot of numerical articulations that can be decoded by the recipient. It is a type of information pressure well appropriate for picture pressure. Waveletcompression can store information in as meager space as conceivable in a record. It is a standout amongst the best techniques in compacting picture. Wavelet calculation depends on multi resolutional investigation; this scientific examination is the general premise of lossless pressure.

The upside of wavelet pressure against JPEG; wavelet pressure breaks down the entire picture without partitioning it into squares, wherein JPEG, a picture is separated into squares and each square is isolated. Wavelet pressure permits getting the best pressure proportion, while in the meantime, keeping up nature of the first varying media flag. Wavelet pressure likewise underpins non uniform pressure, where in, a particular piece of a picture can be compacted more than the other. strategies gauge the nature of pictures in connection to some characterized parameter.

In this paper, three techniques for the compression of stereoscopic images which most frequently mentioned in the literature [9] and whose results are available to us, will be analyzed:

1. Stereoscopic image compression using discrete wavelet transformation and coding using the morphological re-presentation of coefficients, with estimation of disparities within the morphological coder, known
as the Dense disparity map algorithm.
2. Stereo image compression based on quadratic analysis and morphological representation of the wavelet coefficient, known as the Disparity compensated residual algorithm.
3. Stereo image compression based on MRF (Markov Random Field) analysis for the assessment of disparities and morphological coding.

These techniques are applied to pairs of stereoscopic images. Figure 2. shows a pair of stereo images [10] used to test and compare compression techniques in this paper.

The comparison of the above-mentioned compression techniques was done by objective methods for assessing the quality found in the analyzed literature, but also by the subjective estimates of the subjects tested. There are different methods for assessing the quality of stereoscopic and digital images in general. The most common methods for estimating the quality of digital images are objective and subjective methods. Objective methods estimate the quality of images in relation to some defined parameter. Subjective methods for assessing quality, on the other hand, are based on subjective image quality assessments. The respondents evaluate the quality according to personal feelings and observations, as was done in this paper. The interviewees observed the pictures with the use of virtual reality head-mounted display and evaluated their quality with grades of 1-5. The testing process is described in more details in the rest of the paper.

IV. OBJECTIVE COMPARISON OF COMPRESSION TECHNIQUES FOR STEREOSCOPIC IMAGES

different of the target techniques are Peak Signal to Noise Ratio, Mean Square Error MSE, Structural SIMilarity, UIQI (Universal Index Quality), and RRIQA (Reduced Reference ImageQuality Assessment) [19-21]. MSE and PSNR techniques are not confounded and are straightforward and execute. In this manner, they are frequently utilized, maybe regularly in the appraisal of picture quality [22, 23]. These strategies can't give an unbiasedly evaluated quality that coordinates the onlooker's estimation for a wide scope of coding and transmission parameters. This is on the grounds that they think about the tried and reference information, without realizing what they really speak to. They don't consider the qualities of the HVS (Human Visual System), which demonstrate that HVS does not have a similar affectability to various sorts of mutilation and distinctive twisting properties. Also, it is essential to know in which part of the picture the twisting happens, and MSE or PSNR don't consider. They measure the exactness of the flag without displaying any properties of the HVS or picture substance and semantics. As per the writing [11, 12, 18] this research utilizes PSNR as the primary proportion of compacted image quality.

Figures 2, 3 and 4 demonstrate the stereo sets of pictures packed by the methods portrayed in the paper. The first proposed system for the pressure of stereoscopic pictures has a low intricacy of the calculation itself, yet the advancement of the twisting is extremely unpredictable. Along these lines, it is hard to improve the execution of the calculation itself, considering the streamlining criteria for the contortion. An estimation of the pixel difference has the two preferences and inconveniences in connection to the methods dependent on the division of pictures into squares. It influences the low unpredictability of the calculation, abstaining from blocking relics, yet it has lower proficiency as far as mutilation. The proposed strategy likewise has a low level of multifaceted nature because of the straightforwardness of the quantization procedure and the impact on the assurance of the uniqueness inside the pressure plot as a solitary structure. For this method, it very well may be said that it is of low multifaceted nature and that it speaks to the strategy of an elective gauge of uniqueness.

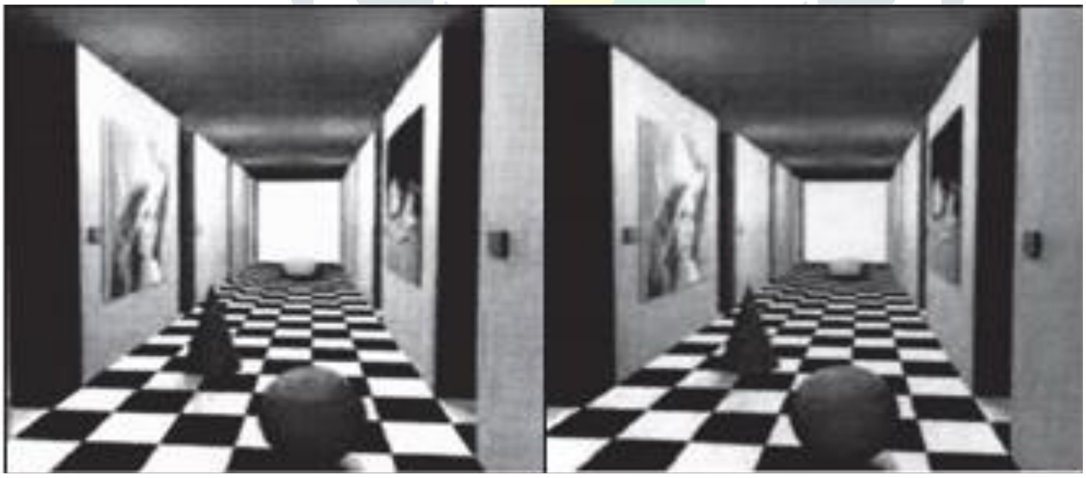
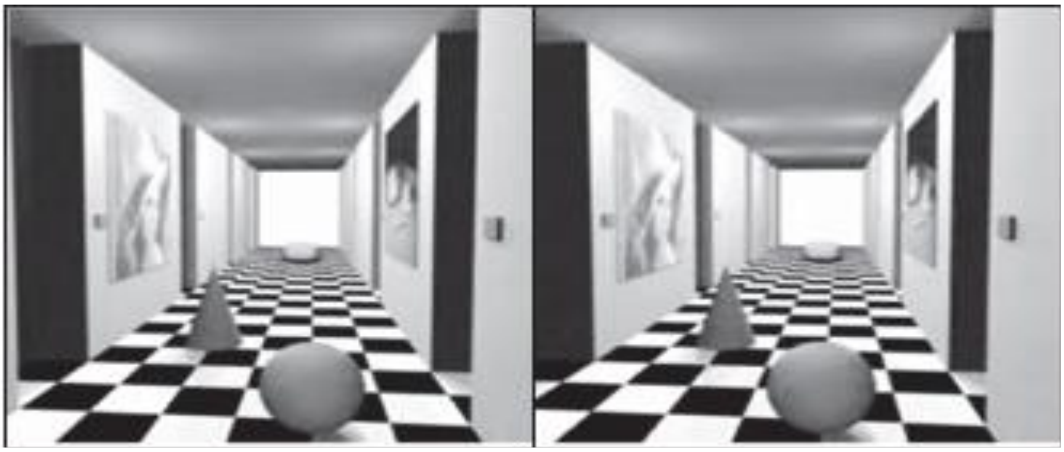


Fig. 2. Examples of stereo pairs of images (left and right) compressed with dense disparity map algorithm

Disparity compensated residual encoder is a robust encoder, which inherits all the benefits of wavelet transformation and reduces the entropy of the transferred images. The experimental evaluation of the proposed encoder[10] has shown that its performance is better than other stereoscopic image coders, since in comparison to the visual quality achieved, it can be said that the coder algorithm of low complexity.



a)Left image b)Right image

Fig. 3. Examples of stereo pairs of images (left and right) compressed with disparity compensated residual algorithm

Fig. 4. Examples of stereo pairs of images (left and right) compressed with Markov Random Field algorithm

The latest proposed technique is MRF. This algorithm obtains smooth disparate fields [24] without increasing residual energy and thus allocates fewer coding bits, and therefore takes less time to complete the algorithm in relation to the previous two suggested techniques. Also, based on the simple visual quality of the compressed images shown in Figures 2, 3 and 4, it is can be concluded that the Dense disparity map gives the lowest quality results, while the Disparity compensated residual algorithm yields high quality results.

V. CONCLUSION

This paper shows a diagram of the pressure systems utilized for picture pressure in a stereoscopic presentation and dissected the outcomes through goal and emotional strategies for evaluating the nature of compacted pictures. As a finish of this examination, it very well may be said that the wavelet method of pressure of sets of stereoscopic pictures does not influence the moment contrasts between matched stereo pictures and along these lines does not influence the level of inundation in the virtual condition made to a limited extent by the stereoscopic presentation, just like the case with standard picture pressure systems. On account of standard pressure strategies, there is a weakness that abrupt changes between difference esteems are impractical. It is absolutely a direct result of the discrete contrasts that happen among packed and uncompressed that the 3D figment is crumbling.

In the future, our goal is a more detailed and more effective analysis of stereoscopic image compression techniques. A larger data set and a more involved experimental protocol are the obvious next steps and after that, the use of resulting data in the development and improvement of the new compression algorithm.

REFERENCES:

1. D'Angelo T. et al.development of a low –cost augmented reality head –mounted display prototype.Examining developments and applications of wearable in modern society.pp.1-28.
2. Ramaprabha T.,Sathik M.M.study of performance measurement factors of stereo image compression .international journal of advanced research in computer science and software engineering ,2012.vol.2.no.7.pp.408-410.
3. Siegel M.W.,Gunatilake P.,sethuramanan S.,Jordan A.G.compression of stereo image pairs and streams.Stereoscopic displays and virtual reality system –international society for optics and phonotics.1994.vol.2177.pp.258-269.
4. Wallace G.K.The JPEG still picture compression standand.IEEE transaction on consumer electronics.1992.vol.38.n01.pp.xviii-xxxiv.
5. Test Model Editing committee.MPEG-4 standard,MPEG97/N/1796-ISO/IECJTCI/SC29/WG11.1997.
6. Kumar V.V.S.,Reddy M.S.I Image Compression Technique By Using Wavelet Transform.journal of information engineering and applications.2012.vol.2.no.5.pp.35-39.
7. Ramaprabha .D.et.al.an analytical study of image compression algorithms for stereoscopic images in non immersive virtual reality world .INTERNAL journals of advanced research in computer science.2010.vol.1.no.4.pp.82-86.
8. Ellinas J.N.Contribution to improvement of compression algotithm for stereoscopic images and video.Available at:http://cgi.di.uoa.gr/phdsbook/files/ok_Ellinas.pdf(accessed:25.08.2017).
9. Bun P.et al.Application of professional and low –cost head mounted devices in immersive educational application .Procedia computer science.2015.vol.75.pp.173-181.
10. Ellinas J.N.,Manolis S.S.A novel stereo image coder based on quad-tree analysis and morphological representation of wavelet coefficients.Department of Informatics and Telecommunications.National and Kapodistrian,U niversity of Athens.2004.vol.157.84p.