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Removal of Crosstalk using Ghost Image Reduction Technique in MATLAB

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ABSTRACT

Now a days commercial 3D display system is growing technology, but optical crosstalk is one of a major issue which reduces their pros. Crosstalk is the deficient seclusion of the left and right image channels hence one image trickles into the other. Even though many methods proposed to solve this issue, the low brightness and extra devices are still unclear harms in those methods. In this paper, a digital image processing technique called Ghost image reduction is presented to reduce the crosstalk in 3D displays. Ghost image reduction is an advanced technique that utilizes the software technique and the pixel structure of the display. The proposed method reduces the crosstalk by modifying the output gray level of the image. The proposed reduction technique extends the angles more than 15% while compared to the existing MZ-DCR technique. Modifying multi zone digital crosstalk reduction to such systems the crosstalk will be reduced while maintaining the luminance of the image without any extra devices.

Keywords: 3D Images, Crosstalk, 3D Display Systems, Digital Image Processing

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INTRODUCTION

Digitalized images require a wide variety of deformations throughout the processing, capsulize, storing and reproduction, any of which may result in a humiliation of visual quality of images. For applications in which images are eventually to be viewed by end users, the only exact method of enumerating digital image quality is through slanted assessment [1].

Three dimensional systems (3D) are getting huge considerations in the recent years due to its demand in applications such as entertainment. Owing to the scientific development, the 3D display also desires a quality improvement. The 3D system, together with stereoscopic and auto-stereoscopic 3D system, can afford 3D images on a flat panel [2]. As said by the method of 3D perception in commercial 3D technology, the mainly frequent technique is to use binocular parallax [3]. Crosstalk, the most important issue in 3D images, reduces the quality of the 3D image. The crosstalk in the image is required to be reduced for improving the quality of the image. Digital image processing is performed for the purpose of diminishing the crosstalk.

In this paper, we propose a digital image processing system that could additionally lessen the optical crosstalk in 3D displays. Ghost image reduction is an advanced technique that utilizes the software technique and the pixel structure of the display. The proposed method reduces the crosstalk by modifying the output gray level of the image. The proposed reduction technique extends the angles more than 15% while compared to the existing MZ-DCR technique. This method controls the image quality based on the structure of a 3D display system. As well as this method effectively purge the ghost imaging technique under the normal viewing condition and in different viewing angle.

RELATED WORK

Yi Pai Huang et.al have proposed a superzone Fresnel LC lens to diminish the lens's response time. Rather than a single lens, lens array was formulated for a 4-inch auto-stereoscopic display, which could carry out fast switching between 2D and 3D images. Polymer stabilized method and overdrive method are proposed in this paper.

Mrs. S. Parvathi and V. Dhanalakshmi have proposed a MZ-DCR method, which was not only based on the software approach but pixel structure also using 3D displays. 3D display with 2DIG panel was employed to show an improvement of MZ-DCR method. Gaussian noise removal was also exploited in that paper.

A paper about understanding crosstalk in stereoscopic displays was proposed by Andrew Woods and Perth. Parameters they have taken into consideration are Crosstalk, ghosting, leakage, LCD, PDP, CRT, DLP, polarized, anaglyph, stereoscopic, autostereoscopic. Along with methods of measuring and characterizing crosstalk, crosstalk reduction and crosstalk cancellation were also discussed.

Andrew J. Woods and Perth have discussed about how the terms crosstalk, ghosting (double exposure) and its associated terms (system crosstalk, viewer crosstalk, gray-to-gray crosstalk, leakage, extinction and extinction ratio, and 3D contrast) were defined. However time consumption of their method was high.

Nicolas S. Holliman et.al have developed a display taxonomy suitable for content producers highlighting displays which have general requirements for image delivery. They have also analyzed key technical characteristics of 3D displays. The drawback of their scheme is missing of image data due to occlusions.

A new approach that combines a new camera architecture based on a digital micro-mirror device with the help of mathematical theories and algorithms of compressive sampling is seen in the work of R. M. Joany et al [4].

R. M. Joany et al [5] discussed the method of zero wavelets algorithm enhancing the low bit rate and compression ratios of the wavelets transform becoming very close to zero. Images tend to contain low frequency information and the high frequency is used for the quality of the image

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METHODOLOGY

The block diagram of Ghost Image Reduction Technique is given in Fig 1.

Principle of Ghost Image Reduction Technique:

Ghost Image Reduction Technique method is employed to lessen the crosstalk in 3D display to repress crosstalk without the usage of any external devices and also varying the layout of the 3D display. The pixel layout of a patterned retarder display is obtained and in order to apply multi zone digital crosstalk reduction to a patterned retarder display a 2 data line and 1 gate line (2D1G) panel is employed. The pixel layout of a patterned retarder display is acquired and in order to apply multi zone digital crosstalk reduction to a patterned retarder display a 2 data line and 1 gate line (2D1G) panel is used. The merits of this method are summarized as follows.

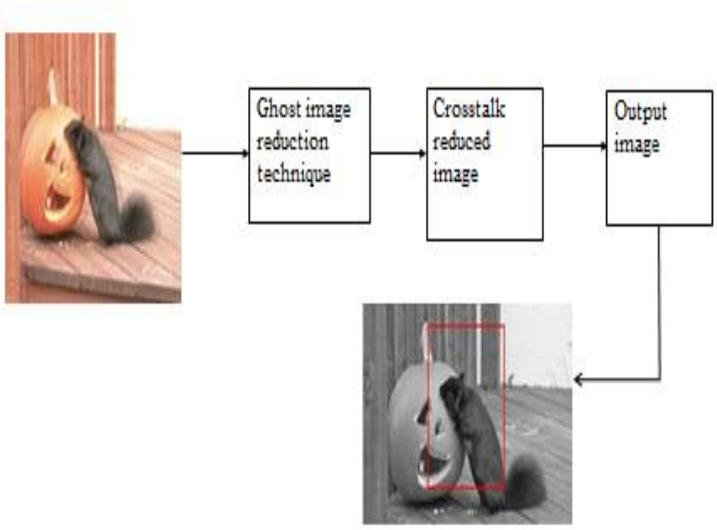
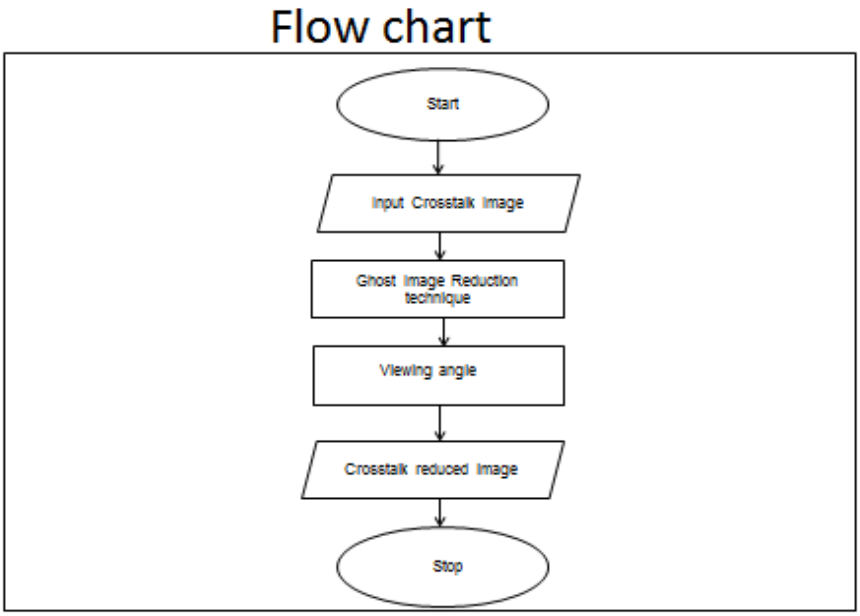


Fig 1: Block Diagram of Ghost Image Reduction Technique



It will reduce the noise effects and reduce the extra hardware problem then eliminate the crosstalk effect and improves image quality

High crosstalk is mainly caused by the light leakage that comes from a different view. The objective is to neutralize the optical crosstalk by modifying the output gray level of each pixel. The main intention of the proposed method is—when observing the panel in a huge viewing angle, even the viewing area is somewhat changed, the image that observer receives will stay the same. Thus, the gray level of major region should be related with both R and L images.

FEATURE EXTRACTION:

3D stereo Input image:

The Input image is extracted from the data base with any one of the file formats among jpg, gif, tif, bmp, png and raw.

Grid Representation:

Image is defined into a variety of sub bands and these sub bands are set as either Low frequency or high frequency. This frequency level varies the diverse RGB image representation into various grids as matrix formats which in turn presents the image levels into grids.

RGB Pattern:

RGB Pattern which primarily signifies the diverse color process in a single image which is indicated for the Multi Level Image representation.

Input vector pattern:

It illustrates the direction as degree of the image that should be rotated and also to be cropped according to diverse input sizes stated in the input file.

Image Segmentation:

It is frequently used for locating the image segments in the known input image to crop the object from the input image.

Image filtering Process:

Image filtering eliminates the noises from the input image and from the segmented image to progress the quality and the performance among the different parameters.

Normalized Output:

At last the output is displayed in the segmented output region that exhibits the file format by eliminating the noise

RESULTS

From the Ghost image reduction technique, the crosstalk image is taken as the input image in fig 3. For removing the crosstalk from input image two types of deblurring with PSF is done in fig 5 & 6.Point Spread Function used to calculate crosstalk pixels in fig 7, representation of reconstructed segmented PSF. In this **Undersized** PSF calculate the crosstalk in specified area and Oversized PSF calculates the crosstalk in overall area in the input image. The image is in gray colour to find out crosstalk in each pixel using PSF is done in fig 8 & array of specified pixel is marked in fig 9. The warm colour is introduced after the removal of crosstalk from the image in fig 10.the given original image is obtained without any crosstalk in fig 11.

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Fig 3: Input crosstalk image

Fig 4: Blurred image

Fig 5: Deblurring with undersized PSF

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Fig 6: Deblurring with oversized PSF

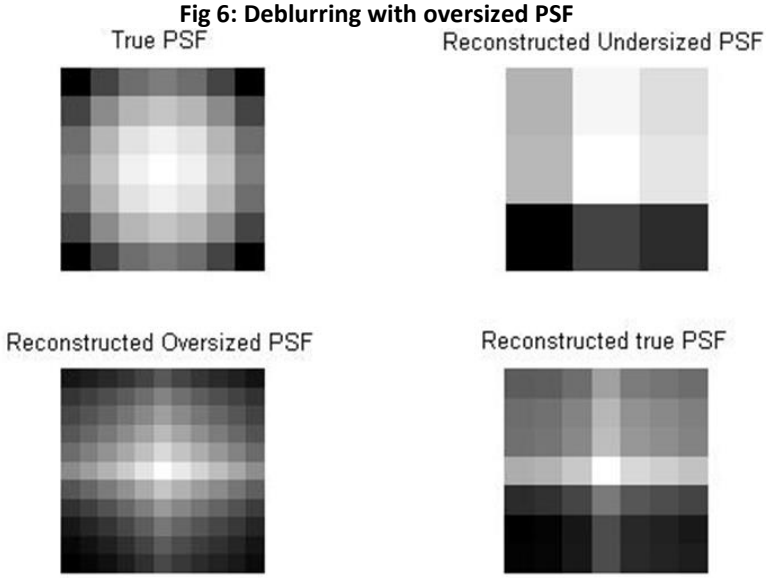

Fig 7: Segmented reconstructed PSF

Fig 8: Crosstalk Image

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Fig 9: Ground truth image

Fig 10: Addition of warm colours

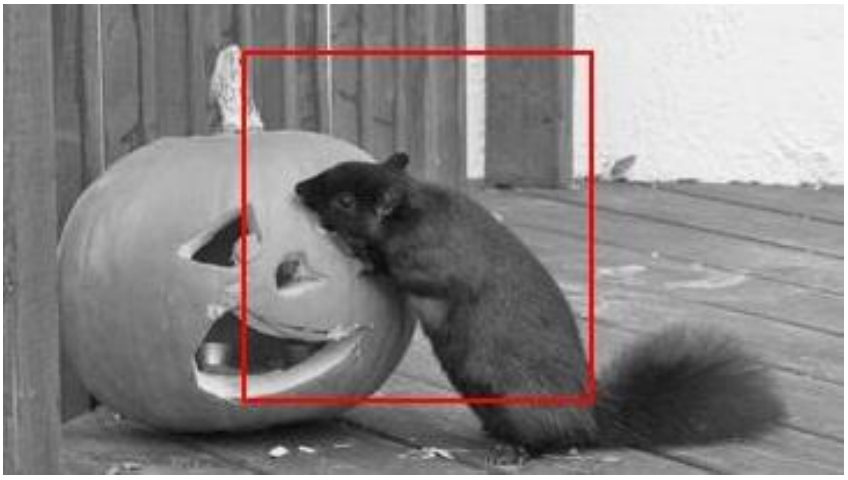

Fig 11: Output Image

CONCLUSION

The Ghost Image Reduction Technique shrinks the crosstalk from the image, which we taken with the crosstalk as well as the input image is scanned in a zig-zag manner. Therefore, the error pixel value is shifted out from the image; which resulted in reducing crosstalk from the original image. In normal viewing angle the image will be free from crosstalk and the 3D image will look same in all viewing angles. In figure 4, quality parameter of the 3D display is evaluated with the compression ratio. The proposed method effectively shrinks the compression ratio as well as the crosstalk; so that crosstalk can be reduced from the original image.

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