IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Issue-5, May 2019 E-ISSN: 2347-2693

Comparative Study on 2D to 3D Medical Image Conversion Techniques

K.A. Mohamed Riyazudeen[1*], M. Mohamed Sathik[2]

[1]Reg.No: 12602, Research Scholar, Dept. of Computer Science, Sadakathullah Appa College, Tirunelveli, Tamil Nadu, India
Affiliation of Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli-12, Tamil Nadu, India
[2]Sadakathullah Appa College, Tirunelveli-11, Tamil Nadu, India

[*]*Corresponding Author: mrriyaz001@gmail.com, Tel.: 9047853173*

DOI: https://doi.org/10.26438/ijcse/v7i5.371379 | Available online at: www.ijcseonline.org

Accepted: 18/May/2019, Published: 31/May/2019

***Abstract*—** The main purpose of this article is to compare the practice of five methods used to convert 2D images into 3D images. The 2D to 3D conversion technique plays an important role in 3DTV development and promotion as it supplies high quality 3D writing equipment. This article analyzes five methods and compares their results to the best ways to create high-quality 3D images. The first method to convert 2D images to 3D based on the depth information map with edge information. The second method uses information for a map of depth based on merger. The third method generates 3D images with random action algorithms. The fourth method creates 3D images using a combination of motion, edge detection, and image breakout, depth estimation, and relocation algorithms. Finally, the fifth method generates 3D images based on the deep nanoscale method. Many performance metrics are used to analyze the performance of these approaches. This file uses PSNR, SSIM, MSE and RMSE for operational analysis. Experimental results suggest that random way works better than the other two ways.

***Keywords*—** 2D-to-3D conversion, depth boundaries, depthmap,nonlocal neighbors, nonlocal random walks.

I. INTRODUCTION

3DTV is widely expected to become the next revolution in television technology. "3D" (three-dimensional) here means "stereoscopic" that gives the audience a sense of diving. 3DTV ads not only depend on advanced technology in the 3D display, but also the presence of large 3D content. However, it is expensive and takes a lot of time to make 3D quality directly with a stereoscopic camera, so the lack of 3D content becomes a major obstacle for the 3D industry. Converting images or videos to 3D is one way to mitigate the early stages of 3DTV development because it is not only able to create 3D content at low cost and less time, but it's also big too. Existing 2D raw materials.

In general, 2D to 3D conversion can usually be classified into two categories: Human Conversion and Auto-Swap. The approach to helping people is to convert 2D video or video into 3D, with some adjustments hand-made by operators [1]. Although this approach works better, it still does not apply in many scenarios. To create a huge collection of available 2D material, the 3D economy needs automatic methods [2]. Automatic method uses dark signals in purple images to create more or less virtual imagery without human help.

There are several studies that develop the 2D to 3D image conversion that will be used in moving pictures [4] and [5]. The 3D imaging system is integrated into a TV set. Etc. In 3D, the 3D scanners help surgeons determine the exact situation of the disease. 3D hardware is expensive compared to 2D hardware. Therefore, it is essential to create fast and accurate algorithms for converting 2D images into 3D images. This article provides a simple new algorithm for converting 2D images into 3D images using image synthesis. Xiaoyang Mao, lbsiyasu L. Kunii Hierarchy is suggested a G-octree as a continuation of the G-quadtree of a 3D gray image. They created the C program on VAX 11/750. The practice of coding the color remnants of the brain in the mouse shows the advantages of this method [6]. Chin-Thun Lin, Chun-Li Chin, Khan-Wei Fan, and Chun-Ion Lin have been shown with detailed imaging and architectural evaluation. They tested several color images in 640 * 480 RGB format. They create left and right image views and display 3D stereo images [7]. H. Mura, H. Mori, S. Yamashita, A. Maenaka, S. Okada, K. Oyamada and S. Kishimoto have proposed a system for converting all 2D images into 3D images. This method is used by calculating the depth of each surface of the 2D image with sharp contrast and color [8]. Wa James Tam and Liang Zhang provide an overview of the basic principles of 2D 3D conversion, a short note about how to take depth using a single image and depth-based presentation. Chao-Chung Cheng, Chung-Te Li, and Liang-Gee Chen have introduced an automated system for converting 2D videos into 3D videos. They place the region as a block using the latest information and apply two filters to create a deep map [10]. Jibin Zhang, Yizhou Wang, Tingting Zhang and Wen Gao describe how to evaluate the

2.5D depth map using signals and signals in the video frame [11]. Chung-Lung Su, Kan-Ning Pang, Ce-Min Chen, Gu-Sian Wu, Chia-Ling Chiang, Han-Rway Wen, Lung Shen Huang, 3D Real Time. 2D video that is accompanied by depth was saved to create 3D video [12]. Yeong-Kang Lai, Yu-Fan Lai and Ying-Chang Chen have requested a hybrid algorithm for 2D-3D conversion. They use linear perspective, linear perspective, and texture characteristics to evaluate the depth. They use a two-sided filter to minimize depth maps and eliminate noise [13].

Digital 2D to 3D Digital Converting Methods Can be Set Free: High quality, high-quality semi-automatic HDTV and high quality 3DTV conversion and low-quality auto conversion for 3DTV, VOD and other similar applications. [14] For semi-automatic conversion, operators with properties provide depth to different parts of the image or video. Depending on this rare depth distribution, the computer algorithm measures depth depth on the whole image or video sequence. In the case of an automated method, there is no operator intervention and your computer algorithm automatically evaluates the depth of the image or video. An automated method evaluates the appearance of shadows, structures, movements, or depth of focus. Consumers use stronger assumptions to develop 2D-to-3D LNBs in real time. Such methods work well in certain scenarios. But in general, it is very difficult to formulate attributes, which characterize the background and foreground combinations. An important step in the 3D system is to create 3D content. Many special cameras are designed to create 3D models directly. For example, two stereoscopic cameras make use of two separate co-plans configurations, each monoscopic camera captures an eye, and depth information is calculated using the binocular spacing. The depth camera is another example. It is a simple video camera added with laser-based elements that capture two-dimensional RGB imagery and a corresponding depth map. A deep map is a 2D function that delivers depth (with respect to a point) of an object's point of view as a function of image coordinates. Normally this is represented as a gray image with the intensity of each pixel recording its depth. Laser elements emit light walls to the real light of the world, which triggers objects in the scene and reflects back. It has been registered and used to create a deep map. All of the techniques described above are used to directly create 3D content that truly contribute to 3D-TV distribution. However, large amounts of current and former media data are in 2D format and should be possible with the Stroke impact. This is where the conversion method from 2D to 3D is saved. This method restores depth information by analyzing and organizing the 2D image structure.

To be successful in converting 2D to 3D, need depth information. Based on the map of this depth we can create stereoscopic images or another image of an image [22] - [24]. Insights are not included in the 2D image. But one who knows a feeling of depth by another study, the monokularni key: Defocus [25] [26], relative height / size and slope of the texture, is a structural aspect of occlusion [27].], Geometry and Texture [28].], [29] and so forth. These monokularni depths reveal the depth of the perception of the person of the ednovidno image. On the basis of these signs were made numerous studies [25] - [33]. Although the picture has different monocular signals for these studies, it is difficult to evaluate the monumental map of monokularni. Lai et al. [25] Estimated depth of defocus. Zo and Sim [26] Create a focused map by evaluating the snow, snow, snow and propagating the amount of snow to get a slim card. This defocus map reflects good news, but it is assumed there are some snow depending on the depth of the image. In other words, the image must be removed from a camera with a shallow depth and a large hole. Jung et al. [27] Mapped by using the corresponding height, the closer the subject in the scene is shown at the bottom of the predicted image. They find the edge information and track a solid line with the corresponding height rule. This method is ideal for simple landscape images, but the depth performance estimation depends largely on the composition of the image. Dimiccoli and Salembier [28] Split the input image using depth and T-lines. The compound T is a feature of the wall that indicates that an object is partially in front of other objects. This method is suitable for images with simple objects, but the depth of the lines worsens by increasing the ambiguity of the T-link in the external image. Cheng et al. [29] Tapped depth map using depth hypothesis. They analyzed the geometric view of the imagery to formulate a hypothetical hypothesis. Han and Hong [30] formulate a hypothesis to consolidate the depth by detecting the point of extinction. It is not easy to create a hypothesis in line with the input image. There are some approaches available. Saxena et al. [31] Practice tracing training to predict depth maps. They collected a set of monitor images and a map of the depth of the true depth of the unencumbered external image. This approach provides a preferred depth map for external images, but requires extensive training data. Liu et al. [32] presented a method based on training using the seven logos to evaluate the depth map. These automated methods are still limited to getting enough practice from any random input. Still in many parts of the conversion from 2D to 3D, progress continues with human interaction. Recently, Ward et al. Showed that approximate depth provided an object similar to an object, although accurate depth estimation was sufficient to create 3D effect [33]. They offer deep information systems of films that use the depth model of the form to create a 3D image. This pseudo-3D technology is useful for reducing human intervention.

This work compares the implementation of three approaches that are used to convert 2D images into 3D images. The 2D to 3D conversion technique plays an important role in 3DTV development and promotion as it supplies high quality 3D writing equipment. This article analyzes three methods and compares their results to find the best way to create high-quality 3D images. The first method to convert 2D images to 3D based on the depth information map with edge information. The second method uses information for a map of depth based on merger. The third method generates 3D images with random action algorithms. The fourth method creates 3D images using a combination of motion, edge detection, and image breakout, depth estimation, and relocation algorithms. Finally, the fifth method generates 3D images based on the deep nanoscale method. Many performance metrics are used to analyze the performance of these approaches. This file uses PSNR, SSIM, MSE and RMSE for operational analysis. Experimental results suggest that random way works better than the other two ways.

The remaining statements are prepared as follows: Section II provides an overview of the initial approach. In Part III, the second method is especially described, including ideas, design and practical methods. Section IV provides an overview of the third method. Section V compares the process of the three approaches. Finally, this conclusion is made in Section VI.

II. 2D TO 3D IMAGE CONVERSION USING EDGE INFORMATION

The whole block chart of this method is shown in Figure 1. This work effectively uses 2D to 3D conversion methods based on the latest information. It is important that the edges of the image look like it can be the edge of the map. When pixels are grouped, the relative depth can be assigned to each area. Figure 1 describes the proposed conversion system. It is assumed that the block image is divided into several groups. Then, the depth of each segment is defined using the initial hypothesis of depth. Contemporary artifacts should be removed by double filter filtered. Finally, the multi-view image is obtained by the DIBR method. As a result, the 2D imaging is a sleek, 3D 3D without artifacts that enhance the image quality on the screen. More details of these modules are discussed below:

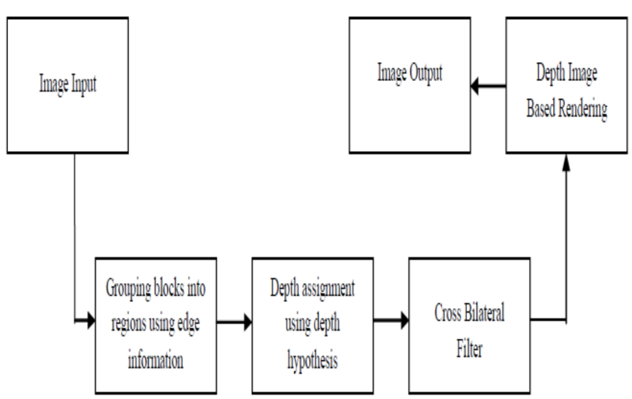


Fig. 1. Overall Block Diagram of Method1

A. Block-Based Region Grouping

The calculated complexity is significantly reduced by the block algorithm. This means that pixels in each block have the same depth. For example, they use four to four blocks. Each node is a 4x4-pixel, 4-pixel block. The value of each relationship is calculated by taking into absolute discrepancy of the average of neighboring blocks. The lower the available value, the greater the similarities between the two blocks. After calculating the absolute difference of the average value of neighboring blocks, the blocks are divided into groups using the smallest part (MST).

B. Depth from Prior Hypothesis

Depth download is important in the conversion process. The biggest difference between 2D and 3D images is the depth information. Objects may appear from the screen and look like real life due to in-depth information. If we tap these deep signals and integrate them together, we will create a solid foundation to make 3D images better. The underlying algorithm is classified into three types that use different types of deep signals: angles, angles and angles. Each symbol represents different depth information. In this conversion process, after creating a block of blocks, the corresponding depth for each block is limited to a sub-hypothetical hypothesis. This process involves creating a deep-level slope gradient, checking the order of the open field, and finally creating a depth map. When the scene change is detected, the linear spectacle of the scene can be analyzed using the line detector algorithm using the Hough transformation.

C. Bilateral Filtering

A two-way filter is not a diacritic, and it also achieves a satisfactory result with an approval. This makes filter parameters intuitive, as their effect does not accumulate for multiple representations. It has been shown that two-way filter is very useful, even though it is slow. It is not linear, and its rating is high because traditional acceleration, such as FFT after FFT, can not be applied. However, later solutions were proposed to accelerate the evaluation of two-way filters. Unfortunately, these approaches seem to rely on estimates that do not base on strong theoretical foundations. Among the two filter options, this conversion method chose the duplex cross-filter. In programs such as computers, it is often useful to break down the need for smooth data to set the edge to be saved. The trans duplex filter selected is a variant of the two filters. This filter is used to compress images to find the edges that need to be saved. The deep map created by blocks of blocks contains blocks of artifacts.

D. Depth Image Based Rendering

The map, with its precise depth, because of the two-cornered filter creates a flat map with a pixel-sized image, and preserves the disturbance of the boundary of the subject. After filtering through a duplex filtering, the depth map is used to create a left / right image or multiple image using a Depth-Based Display (DIBR) for 3D visualization. DIBR for smart 3D TV systems can be shown with a block diagram below. The system includes three areas, depth, depth, 3D, distortion and filling. Smooth filters are the first step that is applied to smooth the image. Then, the difference in the 3D image creates the left and right view, depending on the smooth map and also the intermediate aspect. If there are holes in the image, the holes are filled to fill in the holes.

E. 3D Image Warping

The 3D image change depicts the pixel's center point to the left or right view, depending on the depth of the pixel. In other words, the difference of 3D images translates the pixel position to the depth value.

III. 2D TO 3D IMAGE CONVERSION WITH DEPTH MAP CONTROL USING IMAGE FUSION

The latest digital TVs and camcorders are capable of 3D viewing and visibility. A little TV has the ability to convert 2D movies into 3D movies. But the converted 3D 2D movie is not good. 3D movies are a collection of images or 2D frames. So, converting 2D images into 3D images is used when converting 2D movies into 3D movies. The conversion process needs to be faster and more accurate, so the technique is used as an adapter conversion procedure. There is a need for faster conversion algorithm from 2D to 3D to convert 2D videos into 3D videos. Given time is a key factor, simple algorithms for converting 2D images into 3D images are provided. The steps included in the conversion from 2D to 3D as shown in the fig.2 below

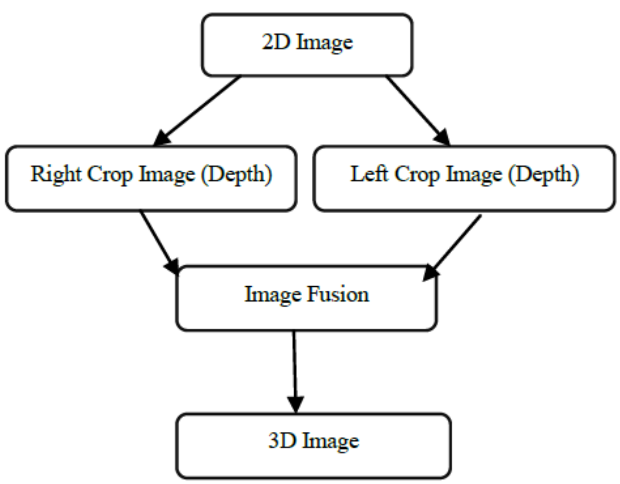


Fig. 2. Overall Block Diagram of Method2

A. 2d to 3d Image Creation using Image Fusion

Images and 2D depth are taken as user input. The image on the right-hand side and left is created from the input 2D image using the user-defined depth value. In addition, the image combinations are applied to the right eye image and the left eye image using the mean values. The depth of 3D images is limited by the user. Finally, images on the left and right image are saved in MPO or PNS or JPS formats. Suggested algorithms take 2D images and are converted into 3D images using the image on the left and the image on the right. The left image view and the image on the right are illustrated using the user-supplied depth. Suggested algorithms use image synthesis. Merging pictures Use the left image and the right eye image to turn off the light. The requested algorithm is simple and fast. New algorithms work with images in gray and color images. The 3D image quality is normal.

IV. 2D TO 3D IMAGE CONVERSION USING RANDOM WALK ALGORITHM

This job uses the Random Alarm (NRW) algorithm to create a precise depth of 2D imagery based on user interaction. First, a graphic pattern is proposed, where the edge matches the link between non-base and non-base pixels. The base edge is calculated by measuring the difference of pixels and the distance from the space is included in the calculation of the non-displaced. Second, the user-defined values are compared to the probabilities that have marked the maximum depth and the probability of unmarked pixels received by NRWalgorithm. Eventually, a deep depth map was restored with a probability. Since non-zero principles are effective in maintaining complex structures in the image, we can restore acute depth. The steps included in the conversion from 2D to 3D as shown in the figure 3 below

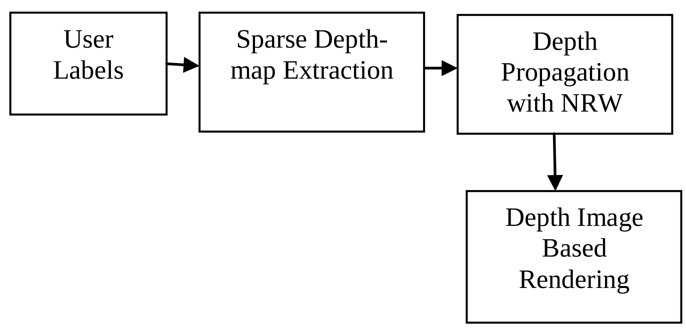


Fig. 3. Overall Block Diagram of Method3

A. 2d to 3d Image Creation using Random Walk

Random walking is the official path of the mathematical path of random steps. For example, a path reflected by a molecule, as it moves in the path of liquid or gas, is to find the cost of changing the stock and the financial condition of a gambler, can be modeled as a walk. Incidentally, although they can be true, it's not really a coincidence. Popular models of accidentally walking in the case of random walks on regular sticks, where each step position bounce elsewhere, according to a probability distribution. In accidental walking, this location can jump to the neighboring location of the grid, forming a lattice path. In the conventional symmetrical walking probability of perhaps the strongest lattice in the region, the location of each of its immediate neighbors is the same. The best case study is the random walk through the d-grid

This method requires the user to clear scarce scratches on the color input image. This method assumes that the input image has the size h x w. The normalized CIE vector $L^*a^*b^*$ at pixel is denoted by. $I_i = [L_{*i}\, a_{*i}\, b_{*i}]^T$ Here, normalize each channel of CIE $L^*a^*b^*$ individually so that all components is within. Let N = h x w and S represent the pixel and the corresponding pixel. We show the components of the matrix and the vector that correspond to the pixels marked by the index. Likewise, the component that corresponds to unmarked pixels is displayed by the above index u. Consider the input image and the S × 1 vector, which has a user-defined depth value for pixels less than 2D to 3D, is to find all pixels of the pixel value.

V. 2D TO 3D IMAGE CONVERSION USING MOTION/EDGE DETECTION, IMAGE SEGMENTATION, DEPTH ESTIMATION ALGORITHM

This work has three main parts: (i) motion detection / completion and image fragmentation, (ii) depth estimation, and (iii) changing rules. The procedure of the first step is shown in Figure 2. A multi-frame needle indicates the left and right eye movements. The frame buffer is used to store the previous frame information, and the information is sent to the capturing and ending section. Motion detection methods calculate the difference between the current frame of the image and the front frame of the image and is generally referred to as "short motion detection".

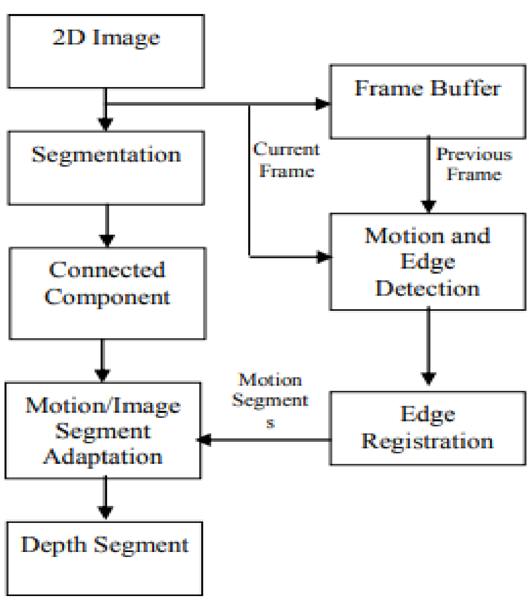


Fig. 4. Overall Block Diagram of Method4

In the section found, the Sobel Edge Edge Edge is used to stretch the edges. The results of motion detection and edge detection are combined together, then gray levels are turned off to create smooth and smooth edges. The Edge Editor module is used to store traffic and edge information in memory. At the same time, partial process begins. The K-Means approach and the Meanhift solution. After the part of the image, the original image is divided into several areas with a label number. The problem with this step is that after the segments of different objects are connected to the same area. The situation is lack of location information. To resolve this problem, the search component matching method for identifying similar color components in the segment is used.

Then this work combines refined complementary elements and movement sections to get a depth map. The final step of the proposed algorithm is the 3D image converter algorithm. After receiving a depth estimate, the image is left and right, with a stereo image. The left and right view are obtained using image depth information and the use of human vision. To get the correct image, the pixel position relative to the plane was viewed. If the pixel is set to zero, it changes to the left, or the correct change is made. If it is on Zero, its location will not change. Then, the smooth gloss filter is applied to fill holes obtained by swap procedures. The resulting image is a converted 3D image.

VI. 2D TO 3D IMAGE CONVERSION USING DEEP NEURAL NETWORK ALGORITHM

This work creates a new way of using a neural network to convert 2D images into 3D images. The procedure of this work is illustrated. 2D image images are converted into dashed sections R, G, B. Tarun (2010) suggests that if light information is needed, only the color image can be transformed into a color image. The conversion method for calculating intensity is; Iy = 0.333R + 0.5G + 0.1666B Intensity values of red, green and blue channels can be obtained by accessing the pixel values of the image. In the image analysis, concealment refers to the act of hiding or enhancing the color of some areas of the image or changing those areas into different backgrounds. Similarly, we can hide the image when any object in the photo is not visible. Since the normal removal of the object leaves the space in the image, the first area of the object must be masked.

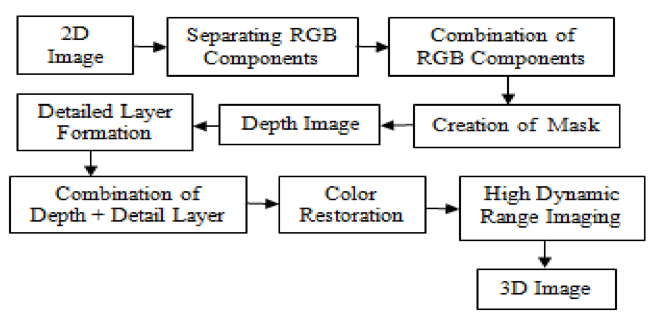


Fig.5. Overall Block Diagram of Method5

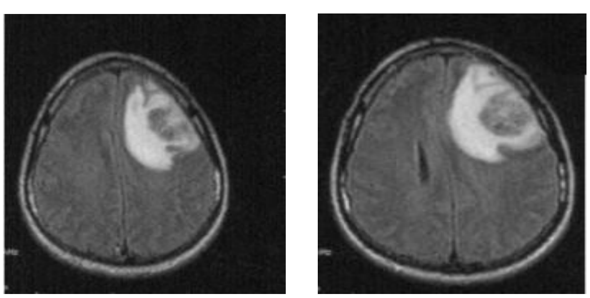
This method works very easily with the background color. Depth or download rating refers to a set of techniques and algorithms intended to get a representation of the space structure of a given set. The map depth approach is divided into active and passive. Active approaches use visual information such as illumination and processing, passivity, reflective energy. The only method of providing absolute measurement with single information based on focusing properties. This method measures the distance of each point in the image by calculating the defocus levels of those points after the human vision system. This measure of progress is mainly carried out by the operator Laplacean calculates the second habitat for each point in the neighborhood of the N pixels in each direction. The pixel focuses on proper distance measurements if the optical properties of the camera are known. Color restore is used to illuminate the image view.

The image has been adjusted using the alignment technology to adapt to make the scan easier. CLAHE works on small plots rather than full. It has the benefit of a nuisance. In the imaging device, the thresholds applied to active elements (movies or CDs) can be changed in two ways. By increasing / decreasing the size of opening or by increasing / decreasing the time of each touch. Changes to exposure to HDR are only effected by changing the exposure time and NO to the depth of the depth. This is because the depth shift also affects depth of field and multiple images, resulting in a very different difference preventing their final merger in a HDR image..

VII. PERFORMANCE ANALYSIS

A. Expiremental Images

Experiments were carried out on a set of color images to verify the effectiveness of the proposed scheme. MRI Brain images are used for experimental purposes. These images are taken from the BRATS 2015 databases. These data are downloaded via https://www.smir.ch/BRATS/Start2015. Some of these images are shown in Figure 6.



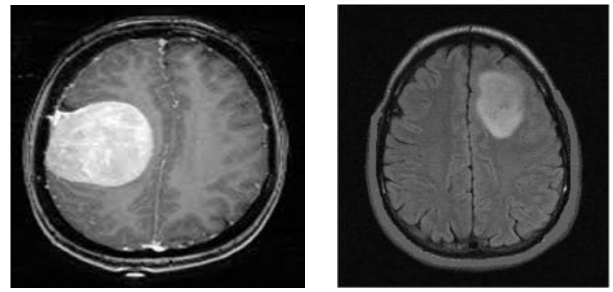


Fig. 6. Expiremental Images of MRI Brain Data Set

B. Performance Analysis

To evaluate the performance of the steganography techniques several performance metrics are available. This paper uses the PSNR,SSIM, MSE and RMSE to analyses the performance.

1. Peak Signal-to-Noise-Ratio

The peak signal-to-noise ratio (PSNR) is used to evaluate the quality between the 3D image and the original 2D image. The PSNR formula is defined as follows:

$$\mathrm{PSNR} = 10 \times \log 10 \frac{255 \times 255}{\frac{1}{\mathrm{H} \times \mathrm{W}} \sum_{x=0}^{H-1} \sum_{y=0}^{W-1} [f(x,y) - g(x,y)]^2} \mathrm{dB}$$

where H and W are the height and width of the image, respectively; and f(x,y) and g(x,y) are the grey levels located at coordinate (x,y) of the original image and attacked image, respectively.

2. Structural Similarity Index

The structural similarity index is a method for measuring the similarity between the 3D image and the original 2D image.

$$SSIM\ (y, \hat{y}) = \frac{\left(2_{\mu_y \mu_{\hat{y}}} + c_1\right)(2\sigma_{y\hat{y}} + c_2)}{(\mu_y^2 + \mu_{\hat{y}}^2 + c_1)(\sigma_y^2 + \sigma_{\hat{y}}^2 + c_2)}$$

where, $\hat{Y}$ is the 3D image, the Y is the original 2D image, μ is the mean and the is the variance.

3. Mean Square Error

The mean square error (MSE) is used to evaluate the difference between a 3D image and the original 2D image. The MSE can be calculated by,

$$\mathrm{MSE} = \frac{1}{n} \sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2$$

where, $\hat{Y}$ is the 3D image and the Y is the original 2D image.

4. Root Mean Square Error

The Root Mean Square Error (RMSE) is a frequently used measure of the difference between 3D image values and the original 2D image values.

$$\mathrm{RMSE} = \sqrt{\frac{\sum_{i=1}^{n}(\widehat{Y}_i - Y_i)^2}{n}}$$

where $\widehat{Y}$ is 3D image and Y is original 2D image.

To analysis the performance of the three methods by using the performance metrics which are mentioned above. This is shown in the below tables and graphs

TABLE.1. Performance Analysis of PSNR

Methods	*PSNR*
Depth with Edge	22.7
Depth with Fusion	25.3
Random Walk	30.4
MESDepth	31.5
Deep Neural Network	38.8

Table.1, it is shows that the psnr PSNR value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network.

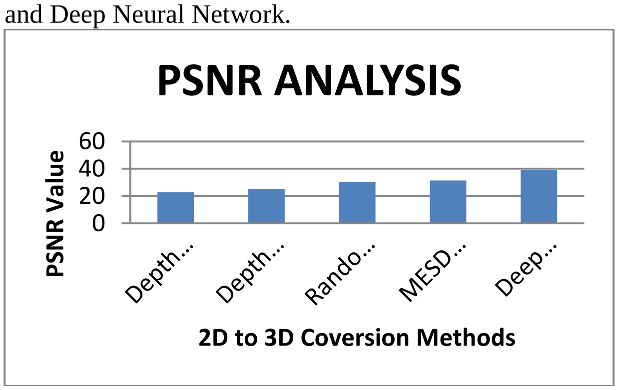


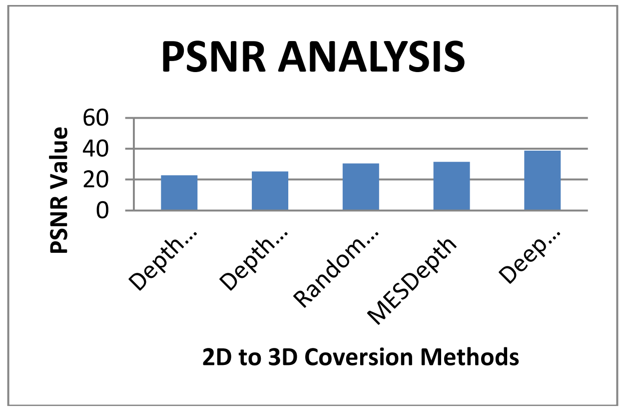
Fig.7. Performance Analysis of PSNR

This paper study the PSNR value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network. The results are captured and showed in Fig. 7. From the above graph it is shown that the PSNR value of the Deep Neural Network method is higher than the other existing approaches. So the Deep Neural Network method is best than the existing approaches.

TABLE.2. Performance Analysis of SSIM

Methods	*SSIM*
Depth with Edge	0.72
Depth with Fusion	0.79
Random Walk	0.84
MESDepth	0.86
Deep Neural Network	0.90

Table.2, it is shows that the SSIM value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network.



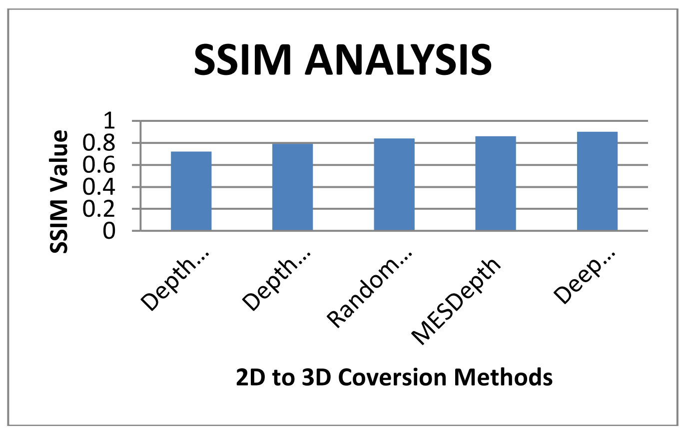


Fig.8. Performance Analysis of SSIM

This paper study the SSIM value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network. The results are captured and showed in Fig. 8. From the above graph it is shown that the SSIM value of the Deep Neural Network method is higher than the other existing approaches. So the Deep Neural Network method is best than the existing approaches.

TABLE.3. Performance Analysis of MSE

Methods	*MSE*
Depth with Edge	5.32

Methods	*MSE*
Depth with Fusion	4.93
Random Walk	2.61
MESDepth	2.12
Deep Neural Network	1.87

Table.3, it is shows that the MSE value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network.

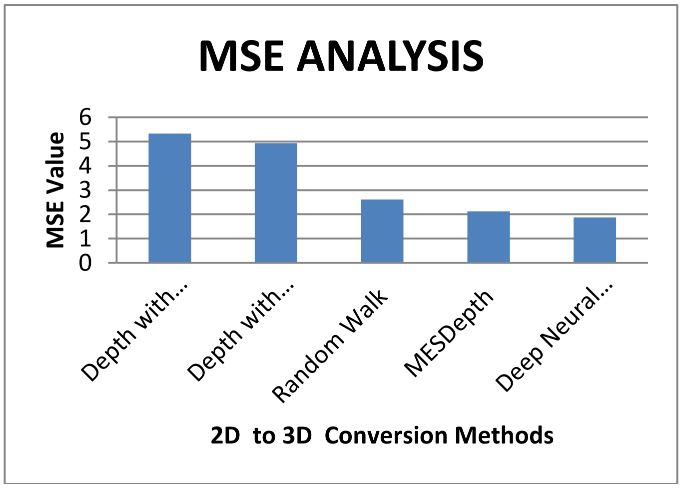


Fig.9. Performance Analysis of MSE

This paper study the MSE value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network. The results are captured and showed in Fig. 9. From the above graph it is shown that the MSE value of the Deep Neural Network method is lower than the other existing approaches. So the Deep Neural Network method is best than the existing approaches.

TABLE.4. Performance Analysis of RMSE

Methods	*RMSE*
Depth with Edge	2.30651252
Depth with Fusion	2.22036033
Random Walk	1.61554944
MESDepth	1.456021097
Deep Neural Network	1.367479433

Table.4, it is shows that the RMSE value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network.

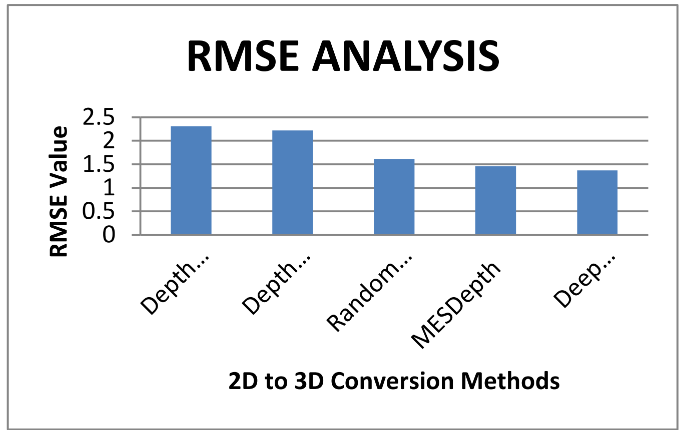


Fig.10. Performance Analysis of RMSE

This paper study the RMSE value of the Depth with Edge, Depth with Fusion, Random Walk, MESDepth and Deep Neural Network. The results are captured and showed in Fig. 10. From the above graph it is shown that the MSE value of the Deep Neural Network method is lower than the other existing approaches. So the Deep Neural Network method is best than the existing approaches.

VIII.CONCLUSION

This document compares the implementation of three approaches that are used to convert 2D images into 3D images. The 2D to 3D conversion technique plays an important role in 3DTV development and promotion as it supplies high quality 3D writing equipment. This article analyzes three methods and compares their results to find the best way to create high-quality 3D images. The first method to convert 2D images to 3D based on the depth information map with edge information. The second method uses information for a map of depth based on merger. Finally, the third method creates a 2D image using the random walk algorithm. Many performance metrics are used to analyze the performance of these approaches. The fourth method creates 3D images using a combination of motion, edge detection, and image breakout, depth estimation, and relocation algorithms. Finally, the fifth method generates 3D images based on the deep nanoscale method. This file uses PSNR, SSIM, MSE and RMSE for operational analysis. The experimental results showed that the deep nanosome method was more effective than the other 4 methods because the method had high PSNR and SSIM, as well as low MSE and MSE values.

REFERENCES

[1] Wikipedia the Free Encyclopedia: Stereoscopy [Online]. Available: http://en.wikipedia.org/wiki/Stereoscopy
[2] Getting Started in Stereo Photography. [Online]. Available: http://home.comcast.net/~dssweb/intro_to_stereo.htm

[3] Wikipedia the Free Encyclopedia: 3D film. [Online]. Available: http://en.wikipedia.org/wiki/3D_film

[4] J. Caviedes and J. Villegas, "Real time 2D to 3D conversion: Technical and visual quality requirements," *IEEE International Conference on Consumer Electronics*, pp. 897-898, 2011.

[5] T. N. Lu and S. Z. Tan, "An algorithm based on bilinear interpolation of converting 2D video to 3D video," *IEEE*, pp. 4813-4815, 2011.

[6] X. Y. Mao and L. K. lbsiyasu, "Hierarchical representations of 2D/3D Gray-Scale Images and their 2D/3D two way conversion," *IEEE*, pp. 37-44, 1987.

[7] T. L. Chin, C. L. Chin, K. W. Fan, and C.Y. Lin, "A novel architecture for converting single 2D image into 3D effect image," *IEEE*, pp. 52-55.

[8] H. Murata, X Mori, S. Yamashita, A. Maenaka, S. Okada, K. Oyamada, and S. Kishimoto, "A real-time 2-D to 3-D image conversion technique using computed image depth," *SID Symposium Digest of Technical Papers*, vol. 29, no. 1, pp. 919-923, 1998.

[9] W. J. Tam and L. Zhang, "3D-TV content generation: 2D-TO-3D Conversion," *ICME*, pp.1869-1872, 2006.

[10] C. C. Cheng, C. T. Li, and L. G. Chen, "A 2D-to-3D conversion system using edge information," in *Proc. Digest of Technical Papers International Conference on Consumer Electronics*, 2010, pp. 377-378.

[11] Z. B. Zhang, Y. Z. Wang, T. T. Jiang, and G. Wen, "Visual pertinent 2D-TO-3D video conversion by multi-cue fusion," in *Proc. 18th IEEE International Conference on Image Processing*, 2011, pp. 909-912.

[12] C. L. Su, K. N. Pang, T. M. Chen, G. S. Wu, *et al.*, "A real-time Full-HD 2D-to-3D conversion system using multicore technology," in *Proc. fifth FTRA International Conference on Multimedia and Ubiquitous Engineering*, *IEEE*, 2011, pp. 273-276.

[13] Y. K. Lai, Y. F. Lai, and Y. C. Chen, "An effective hybrid depth-generation algorithm for 2D-to-3D conversion in 3D displays," *Journal of Display Technology*, vol. 9 no. 3, pp. 154-161, March 2013.

[14] Jean Maria Dominic," Recent Trends in 2D to 3D Conversion: A Survey", MG University, IJRASET Vol.2 IV, April 2014.

[15] GUAN, S., KLETTE, R. Belief Propagation on edge image for stereo analysis of image sequences. In Proceedings Robot Vision. LNCS 4931, 2006,

[16] BENCO, M., HUDEC, R. The advances image segmentation techniques for broadly useful retrieval in large image database. In NSSS IX. TatranskeZruby (Slovakia), 2006,

[177] HE, R., ZHU, Y. A hybrid image segmentation approach based on Mean Shift and fuzzy C – Means. In Asia – Pacific Conference on Information Processing., 2009.

[18] WANG, G., JU, H. A disparity map extraction algorithm for lunar rover BH2. In IEEE International Conference on Intelligent Computing and Intelligent Systems ICIS 2009. Shanghai, 2009, vol. 4.

[19] McKINNON, B., BALTES, J. Practical region – based matching for stereo vision. In IWCIA. 2005, vol. 3322 of Lecture Notes in Computer Science, Springer,

[20] KUHL, A. Comparison of stereo matching algorithms for mobile robots. Centre for Intelligent Information Processing System. 2005, University of Western Australia,

[21] SIQIANG, L., WEI, L. Image segmentation based on the Mean-Shift in the HSV space. In 26th Chinese Control Conference, 2007.

[22] Kauff, P., Atzpadin, N., Fehn, C., Müller, M., Schreer, O., Smolic, A., & Tanger, R., (2007) "Depth map creation and image-based rendering for advanced 3DTV services providing interoperability and scalability", Signal Process.: Image Commun., Vol. 22, No. 2, pp217-234.

[23] Shin, H.-C., Kim, Y.-J., Park, H., & Park, J.-I., (2008) "Fast view synthesis using GPU for 3D display", IEEE Trans. Consumer Electronics, Vol. 54, No. 4, pp2068-2076.

[24] Jung, C. & Jiao, L. C., (2011) "Disparity-map-based rendering for mobile 3D TVs", IEEE Trans. Consumer Electronics, Vol. 57, No. 3, pp1171-1175.

[25] Lai, S.-H., Fu, C.-W., & Chang, S., (1992) "A generalized depth estimation algorithm with a single image", IEEE Trans. Pattern Anal. Machine Intell, Vol. 14, No. 4, pp405-411.

[26] Shuo, S. & Sim, T., (2011) "Defocus map estimation from a single image", Pattern Recognition, Vol. 44, No. 9, pp1852-1858.

[27] Jung, Y. J., Baik, A., Kim, J., & Park, D., (2009) "A novel 2D-to-3D conversion technique based on relative height depth cue", in Proc. Stereoscopic Displays & Applications XX, Vol. 7237, doi: 10.1117/12.806058.

[28] Dimiccoli, M. & Salembier, P., (2009) "Exploiting T-junctions for depth segregation in single images", in Proc. IEEE Conf. Acoustics, Speech, & Signal Processing, pp1229-1232, Taipei, Taiwan.

[29] Cheng, C.-C., Li, C.-T, & Chen, L.-G., (2010) "A novel 2D-to-3D conversion system using edge information", IEEE Trans. Consumer Electronics, Vol. 56, No. 3, pp1739-1745.

[30] Han, K. & Hong, K., (2011) "Geometric and texture cue based depth-map estimation for 2D to 3D image conversion", in Proc. IEEE Int. Conf. Consumer Electronics, pp651-652, Las Vegas, NV, USA.

[31] Saxena, A., Chung, S. H., & Ng, A. Y., (2006) "Learning depth from single monocular images", Advances in Neural Information Processing Systems 18, Y. Weiss & B. Sch. Ed. Cambridge, MIT Press, pp161-1168.

[32] Liu, B., Gould, S., & Koller, D., (2010) "Single image depth estimation from predicted semantic labels," in Proc. IEEE Conf. Computer Vision and Pattern Recognition, pp1253-1260, San Francisco, CA, USA.

[33] Ward, B., Kang, S. B., & Bennett, E. P., (2011) "Depth director: A system for adding depth to movies", IEEE Computer Graphics and Applications, Vol. 31, No. 1, pp36-48.

[34] Felzenszwalb, P. F., & Huttenlocher, D. P., (2004) "Efficient graph-based image segmentation", Int. J. Computer Vision, Vol. 59, No. 2, pp167-181.

[35] Li, Y., Sun, J., Tang, C.-K, & Shum, H.-Y., (2004) "Lazy snapping", ACM Trans. Graphics, Vol. 23, No. 3, pp303-308.

[36] Cantoni, V., Lombardi, L., Porta, M., & Sicard, N., (2001) "Vanishing point detection: Representation analysis and new approaches", in Proc. 11th Int. Conf. Image Anal. and Process, pp90-94, Palermo, Italy.

[37] Canny, J., (1986) "A computational approach to edge detection," IEEE Trans. Pattern Anal. Machine Intell., Vol. 8, No. 6, pp679-698.

[38] Gonzalez, R. C. & Woods, R. E., (2010) Digital Image Processing, Third edition, Upper Saddle River, Pearson Education.

[39] Jachalsky, M., Schlosser, & Gandolph, D., (2010) "Confidence evaluation for robust, fastconverging disparity map refinement", in Proc. IEEE Conf. Multimedia and Expo, pp1399-1404, Gold Coast, Australia.

[40] Lie, W.-N, Chen, C.-Y., & Chen, W.-C, (2011) "2D to 3D video conversion with key-frame depth propagation and trilateral filtering," Electron. Lett, Vol. 47, No. 5, pp319-321.

[41] Kim, J., Choe, Y., & Kim, Y., (2011) "High-quality 2D to 3D video conversion based on robust MRF-based object tracking and reliable graph-cut-based contour refinement", in Proc. Int. Conf. Information and Communication Technology Convergence, pp360-365, Seoul, Korea.

