Swift & Novel Algorithm for 2D to 3D Conversion of HD Image using Energy Reduction Approach

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Abstract

Video, audio and multimedia offer powerful means of communication. Moving pictures are excellent for showing how things change or how something is done, for establishing a context for information (such as a landscape or a working environment) to make it easier for an audience to relate to what you are saying. Three-dimension (3D) technology increases the visual quality as compared to (2D) technology. In present era every multimedia device needs 3D technology. The depth information needed for the generation of 3D form 2D content. Therefore, conversion of 2D video/image into 3D has become an important issue in emerging 3Dapplication. 2D to 3D conversion is basically based on accurate algorithm. This work presents Swift & Novel algorithm for 2D to 3D Conversion of HD Image/video. This approach will automatically convert 2D content into 3D content. In this work a novel approximate algorithm for 2D to 3D conversion. That algorithm include depth map generation unit and depth image based rendering (DIBR) process.

Keywords: SPAA, DIBR, Gaussian, 2D, 3D, Approximation, HD

I. INTRODUCTION

A. Overview:

WITH the recent advancement in 3-D displays, 3-D content visualization has become very popular in our daily life [1]. Recently, 3-D contents are being used in 3-D photography [2], 3-D broadcasting system [3], 3-D movie [4], etc. In contrast to the traditional 2-D content visualization, 3-D content provides an impressive visual experience and heightens a sense of realism with depth perception of the observed scene. 3D video is getting immense public attention recently because of vivid stereo visual experience over conventional 2D video. There are several methods to produce 3D content, such as active depth sensing, stereo camera recording, and 3D graphics rendering using of this approach 3D content is generated.

As we can see in fig. 1.1 vision algorithm performance flow according to increase in time. Quality of video increases now in present era Video has be- come more realistic with heavy resolution, at present 720P, 1080P and 1280P are known as HD video, This HD video are now convert into form of 3D HD video so for market demand 2D to 3D conversion is needed. There are many
areas which require 2D to 3D conversion like medical, entertainment and lm industry. At present era film industry are mainly using 2D to 3D conversion technique.

**B. Glass Work:**

Why 3D glass is needed? 3D image is combination of two image i.e left & right image and by help of 3D glass we can feel 3D effect because these both image are mask with red and blue color and 3D glass project depth on our mind.

2D to 3D conversion is mostly based on accurate algorithm and accurate algorithm is faced with time complexity problem. So for reduction of this problem many researchers are working in this area.

Fig. 1.2.1: How 3D Glass Work

For reduction of time complexity issue we were apply approximation. It is a key for solution of time complexity related problem at algorithm

Fig. 1.2.2: Different area of 3D application

As we know approximation means we can apply some modification on design and based on that design we will get some output and error at particular output is neglect by human eye. Human eye accuracy level is up to 90% to 95% so why we design those logic which give 100% result.

**II. Problem Identification**

- Depth map quality- In 3D view important part is 3rd dimension which is depth, but in previous 2D to 3D conversion method generated depth map quality is not good so generated 3D output is look like artificial.
Time complexity - In 2D to 3D conversion method at the algorithm level time complexity is the main issue. Previous approach requires a large time for generation of depth map, left and right view.

Visuality quality - In 2D to 3D conversion process 3D content is generated by 2D content. This conversion process affects the visual quality of generated 3D content.

Virtual depth - In the previous algorithm generated depth map is look like virtual depth.

A. Need of 2D to 3D conversion-

- As we see that 3D technology is uses in much image/video application and at present image/movie are captured in the form of 2D.
- If we are using 3D technology for capturing of image/video so it is an expensive process.
- In every 3D application, inputs are taken in the form of 2D image/video and by using some conversion technique output is converted into 3D image/video.
- Example: This phenomena are mainly using in 3DTV concept because our input image/video are captured in the form of 2D and by satellite we are receiving 2D data, then these 2D data are converted into 3D. With the help of 3D glass we can watch that 3D data.

III. Methodology

This flow (fig. 3.1a) shows how 2D content is converted into 3D content, so there is first step is find 3rd dimension which is known as Depth. After generation of depth map for 3D view left & right image is generated by depth image based rendering process (DIBR). Generated left and right image have some holes so for reduction of this problem hole filling process is required. In a next step filtered left and right view are produced 3D output. This is a conversion process of 2D video/image to 3D video/image. Here 2D to 3D conversion process is based on single frame approach.

A. 2D to 3D Conversion Unit:

In this depth map process basically there is three different type of depth is generated those are:

- Edge Based Depth Map
- Smooth Based Depth Map
- Colour Transformation Based Depth Map.
B. Work flow of 2D to 3D conversion:

According to methodology in 2D to 3D conversion first input image is inserted which convert that image in to depth map. Using that depth map we apply both image and depth map at Depth image based rendering unit. This unit generate left and right image after that it will pass from whole filling that we get final Left and Right Image. Using analygraph approach we will generate final 3D image.
IV. APPLICATIONS

As we know in present era every one need realistic view, and that view is only possible by using of 3D logic. We also know there is lots of approaches are there which will generate 3D image/video. So there is followings application where we are using 2D to 3D Conversion:

1) Medical Image Processing
2) Digital Image Processing
3) Video image Processing
4) Mobile Application
5) 3D TV Technology
6) 3D Printer Technology

V. RESULT & ANALYSIS

In this chapter result & analysis of algorithm is presented. Here at algorithm level subjective analysis is performed on Matlab. Standard image quality parameters are used for image quality measurement.

A. Algorithm level analysis:

- The algorithm 2D to 3D conversion of HD video is implemented by using of matlab and objective analysis is done for test image which is taken from one movie clip.
- Test Image:

![Test Image](image)

B. Objective Analysis:

- The algorithm is implemented on Matlab & subjective analysis on personal computer with Intel quad-core i3 CPU and 3 GB RAM is used to measure processing time test image (1280 X 720).
- Here four parameter are taken and according to that results are generated.
- Memory complexity problem is reducing which results in improvement of 12%.
- Time complexity problem is reducing which results in improvement of 95%.
- Here structural information, structural similarity (SSIM) parameter is used this is a new parameter. this parameter will check structure similarity between main image and reference image and according to that it will give score.
- In terms of fast algorithm, approximate approach is applied which results in reduction of memory and time complexity.

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<th>EDGE[21]</th>
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VI. CONCLUSION AND FUTURE SCOPE

Algorithm of 2D to 3D conversion is a combination of depth map, DIBR and hole filling. For depth map generation edge detection, Gaussian filter, process is requiring all these parameters are used for image quality measurement. Overall 2D to 3D conversion approach is implemented on the algorithm and architecture level. At algorithm level all analysis is done in matlab. Generated3D content from algorithm is analyzed by subjective and objective analysis. At objective analysis the algorithm achieves reduction in time complexity. It requires 530 msec per frame. Image/video applications require large memory unit so this algorithm reduces the problem of the large memory unit. Approach requires only 7.201Mbyte. The approach achieves 12% reduction in memory complexity as compare edge based [21]. Similar generated 3Dcontent is passed from different image parameters, which results small degradation in image quality.

Algorithm and architecture of fast and approximate processing unit for 2d to 3d conversion for hd video used in 3DTV, movies etc. In future compression techniques can be merged with 2D to 3D technology. Compression techniques are like MPEG, JPEG, H.264 and HEVC etc. Here 2D Gaussian smooth filters and edge detection is also by using of approximation technique, which results reduction in hardware and time complexity. As we know edge detection, smooth filter are very important for many multimedia application. In future we can use, approximate smooth filter, edge detection in different multimedia applications.

VII. REFERENCES

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