

## Convert 2D Images to 3D Image

G.M.S.M. Gaspe, R.M.T.C.B. Ekanayake and P.N. Wijesooriya  
Uva Wellassa University, Badulla, Sri Lanka.

### Introduction

Image processing plays a major role in modern technology. Implementations of this field are varying from simple applications like documentation to complex applications like space context. Before use in the above applications images should be processed using relevant techniques. There are many software that can process the images and get the outputs to be used in the above mentioned applications. Conversion of 2D images into 3D format is essential in applications such as automatic navigation of robots and vehicles, satellite identification and fault diagnosis, medical reasoning and remote surgery (Pollefeys et al., 2000). With developed software user can obtain 3D images using 2D images in a lesser time and the human interaction have been eliminated to a single step.

### Methodology

MATLAB is a technical computing language used throughout the research (Background on matlab image processing toolboxes, 2013). The system allows user to input two stereo images of the object which is to be converted into 3D. Then the image pair is read and converted to gray scale for the matching process. To have more efficient and accurate results two system objects were used.

Basically red-cyan channel images give 3D visualization when visualized with 3D spectacles or one with a red and cyan vision. So the conversion of two stereo images to cyan and red is done. RGB value of cyan is 0,255,255 and RGB value of red is 255, 0, 0. So left image is  $(:,1:1)=0$  and right image is  $(:,2:3)=0$ .

For the best block matching step, extract the 7 X 7 pixel block is considered in the right image and search along the same row in the left image (Image point matching, 2013). Sum of absolute difference is used to compare the image regions. Template Matcher System object is used to increase the accuracy of blocks matching ([www.imageprocessingbook.com](http://www.imageprocessingbook.com)). Then allocating space for all template matcher system objects is done. Scan is done over all rows and columns and disparity bound is calculated for each. Then template and region of interest is constructed. Depth map have positive values only. Finally As there are noisy patches and bad depth estimates everywhere noise filtration is done.

### Results and Discussion

In MATLAB command window the user have to input the pair of stereo image separately as left image and right image with the data type of the image.



Figure 1. Left image in cyan and right image in red.

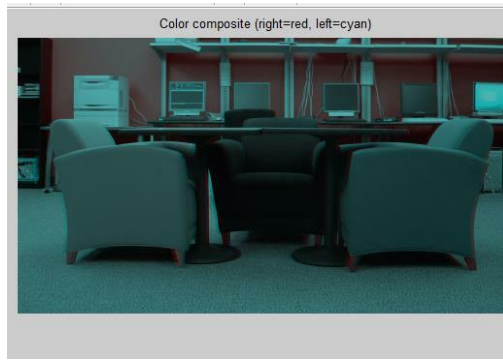


Figure 2. Color composite image of red and cyan images

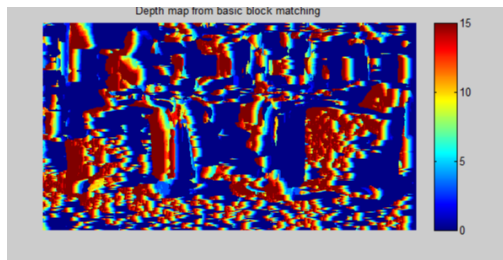


Figure 3. Depth map for block matching

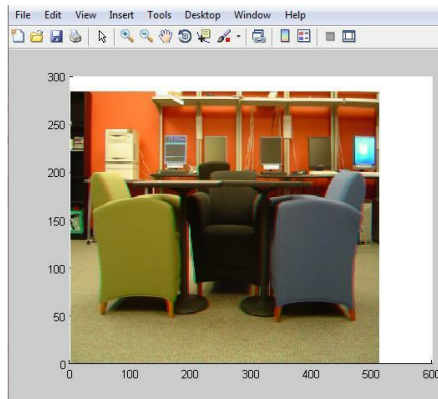


Figure 4. 3D image from the front view

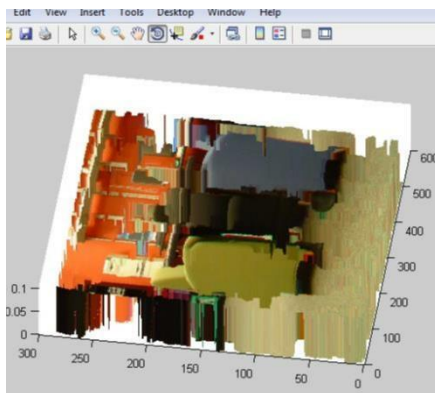


Figure 5. 3D image Az: 14, El:

74

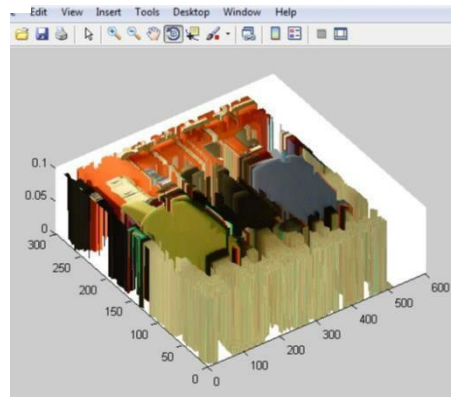


Figure 6. 3D image Az: 15, El: 54

## **Conclusions**

According to the results got for time taken for basic block matching process, it is clear that processing time depends upon dimensions though images have the same bit depth. Files saved in jpg type take less time to process when compared to png type with the same dimensions and file size. So it is better to use jpg as the image type as processing time is a critical factor for an efficient effective output.

It is better to use rectified images for the computation of depth map. In rectification stereo images are taken onto a common plane to get the corresponding points have the same row coordinates. Stereo image rectification is used as a pre-processing step for computing disparity or creating anaglyph images.

## **References**

Pollefeys, M., Koch, R., Vergauwen, M., Vangool, L., 2000. Automated reconstruction of 3D scenes from sequence of images, Retrieved January 31, 2013 from World Wide Web: <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.21.4714>

Background on matlab image processing toolboxes. Retrieved January 31, 2013 from Word Wide Web: [www.imageprocessingbook.com](http://www.imageprocessingbook.com)