# Stereoscopic Modelling of 3-D Anagylph Image

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*Abstract* – **We discuss depth measurement method using camera. In this paper we use high resolution camera to take image pattern and estimate distance. The precision of the measurement of the position and orientation of objects in space is highly dependent upon the accurate camera calibration of a number of physical parameters for imaging cameras. Some of the article has shown that for two cameras stereo triangulation methods to work in practical situations that severe mechanical positioning constraints must placed on pair of cameras. In practice most of the image occupies maximum space based on the absolute value in the space. The distance measurement is proposed which introduce the disparity and depth map. Such a depth map represents valuable, add information that can be leveraged in subsequent steps of the formation of three dimensional videos.**

***Keywords- stereo vision, distance measurement, disparity estimation, depth map, anaglyph image.***

## I. INTRODUCTION

The distance between object and image is known as depth map. It is one of the important features for estimating the distance object. Stereo vision is often used to estimate depth in scenes. The ability to find the depth information in multiple images. Stereo vision is a visual perception of depth to the different of object. By comparing information object from multiple angle of the camera. The stereo camera receives a different image of a same object doing so they converge. By taking two images of the same object and matching the corresponding object will give you the distance to the object.
The binocular vision of two eyes and the main cue for depth perception and distance. Stereo vision is also a retinal disparity of two images. The two images are mainly used cue for depth.

## II. STEREOSCOPIC SET UP.

Images from a pair of cameras separated by a certain distance from a stereo image pair [5]. The position of a certain object in one of the images will be shifted in the other image by an amount inversely to the distance between the object and the camera arranges. The displacement is called disparity and can be computed for each pixel to form a disparity map.C1 and C2 is the left and right camera [7]. Ref table 1 distance calculated and refer the equation 1to 6.

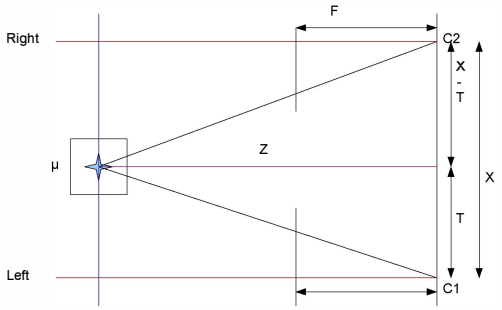


Fig.1 Stereo vision system

$$h = \frac{d}{\tan(90 - l) + \tan(90 - r)} \quad (1)$$

$$d1 = \frac{X}{l - r}\sqrt{(l + r)(l + r) + 4 * f * f} \quad (2)$$

$$d2 = \frac{X}{r - l}\sqrt{(l + r)(l + r) + 4 * f * f} \quad (3)$$

$$\frac{x}{z} = \frac{l}{f} \quad (4)$$

$$\frac{x - T}{z} = \frac{r}{f} \quad (5)$$

$$z = f\frac{T}{d} \quad (6)$$

Where,
T is the distance between focal point of the cameras.
z is the height of distance between object and camera set up.
f is the focal length of the camera.
d is the distance of the object from camera.

| Image | Pixel |
|---|---|
| **Left image** | **X1= 535, X2=348** |
| **Right image** | **Y1= 174, Y2=148** |
| **Distance in centimeter** | **145.1557** |
| | |

| | |
|---|---|
| **Left image** | **X1=368, X2=197** |
| **Right image** | **Y1=285, Y2=169** |
| **Distance in centimeter** | **332.9417** |

Table 1 Calculated distance.

## III. DISPARITY OF STEREOSCOPIC IMAGES

The depth information from a set of two or more images , a matching process is applied to find point corresponding [11] between the input images.The displacement between two corresponding points is reffered to as disparity. It comprises three stages ;image rectification, distortion correction and pre processing. Input for the initial disparity estimation is an image pair consisting of left and right view . The difference between left and right images is called disparity[10]. The depth map is inversly proportional to the disparity map.

Fig. 2(a) Right image

Fig. 2(b) Left image

B,*Camera calibration*

Camera calibration is the process to estimate those parameters using the captured images. To calibrate the camera, we extract all the corner points from each image and then calculate the internal parameter and external parameter. The internal parameter represents the internal features of focal length, image centre, parameters of lens distortion. The external parameter align left image and right image[3].

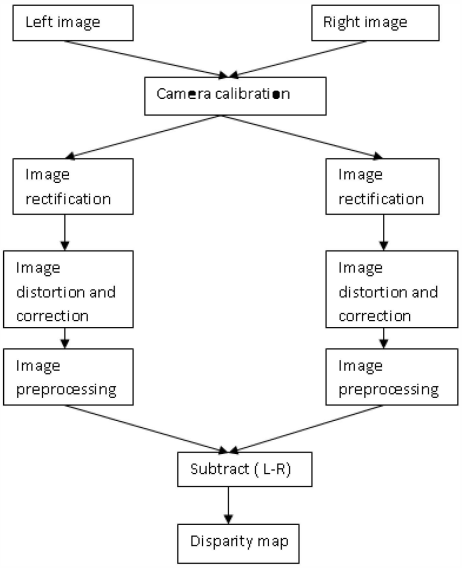


Fig.3 disparity map flow process

Fig. 4(a) Left contrast image

Fig. 4(b) Right contrast image

In order to show the difference between left and right image. I have made an identification mark for the left image.

*A. Difference of two images*

The left and right image merge gives the difference of two image. While viewing in both the eyes the point which matches by both the eyes that point is said to be occlusion. Easily the viewer can identify the difference of two image. Matching the two images[9] correspondence problem 1,dense map 2, feature based method and 3,pixel based method[1].

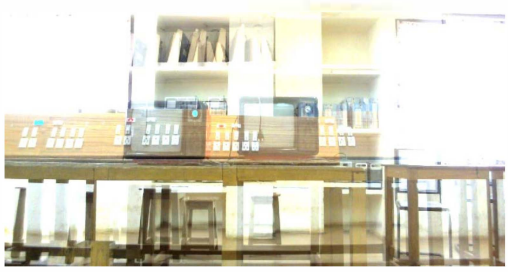

Fig.5 Merge two images

*B. Image rectification.*

Image rectification is a transformation process used to project two or more image onto a common image plane. It corrects image distortion by transforming the image into a standard co-ordinate system[8].

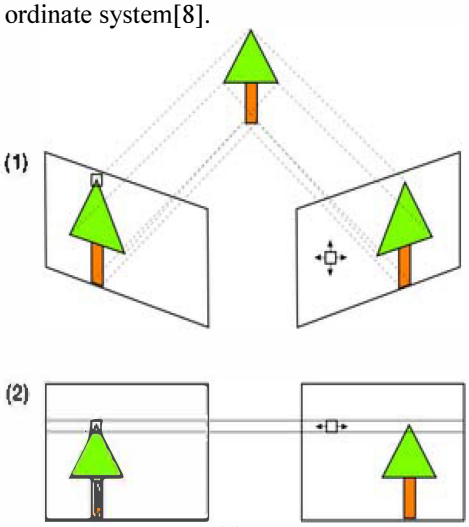


Fig.6.(1). Normal image.
Fig.6.(2). Rectification image.

Fig.7 turns the stereo pair

Fig.8 standard form stereo pair

Fig 7 shows the slant arrow identification mark of left two input image of turn standard stereo pair and fig 8 shows the straight arrow identification mark of same left two input images.

*C. Image distortion correction in two image.*

The image distortion and correction process is eliminate the orginal color. The left image color is violet and right image color is normal wooden color.The fig 9 shows the output of distortion correction images[4].

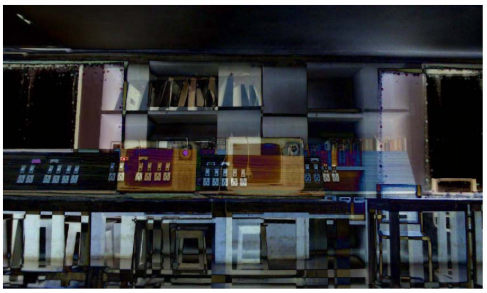

Fig.9 Absolute difference of two image.

*D. Image preprocessing.*

The image preprocessing is used to estimate the unwanted noise of left and right image. The viewer can identify the noise red color and wooden box show in the fig 10. Wooden box is blue color.

Fig.10 Image preprocessing.

*E. Validation of disparities.*

The validation of disparity means subtract the left and right image or subtract right and left image. The output of validation disparities the right only show the black color.

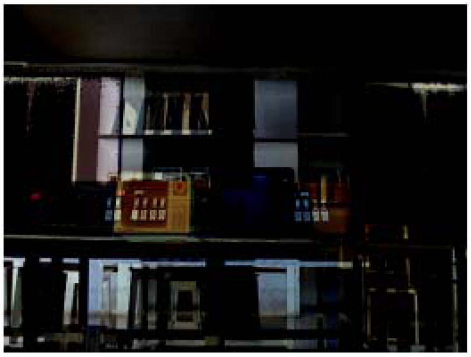

Fig.11 Subtract the two image.

*F. Disparity map.*

Fig 12 shows the disparity map of output. Dispariry map is used to estimate calculate the two different image of angles[6].

Fig.12 Disparity map output.

*G. Anagylph image.*

The anaglyph images are used to provide a stereoscopic three dimensional effect. When the viewer wear a eye glasses two lenses are different color such as red and blue. Images are made up of two color layers superimposed but offset with respect to get the depth effect.

Fig.13(a) Left image depth map.

The foreground and background are shifted laterly in opposite effect directions. In a red-blue glass for eye covered by the red pars of the image as white and the blue part as black providing the adaption color and the eye covered by the blue filter perceives the opposite effect.

Fig.13(b) Right image depth map.

The brain blends together the image it receives the from each eye and interprets the result of different distance. Result obtained. This we introduce a depth map in stereo vision system. Since captured the images from the stereo camera and remove the noise. The color image are also processed to generate their disparity map and depth map proposed method is formation of three dimensional video.

*H. Stereo left and right image*

Fig.14 Stereoscopic vision

## IV. CONCLUSION

In this paper we discussed about depth measurement method using high resolution camera and estimated the distance easily wherever the object has been placed. Our stereo vision method overcomes the distance error. Conventionally, a stereo vision used to reduce the correspondence problem. Using anaglyph method we calculated the distance between foreground and background of the object .In future this work can be extended in stereoscopic video.

## REFERENCES


[1] A.S.ogale and Y.Aloimonos ,"shap and the stereo correspondence problem," computer vision, international journal of , vol.65, no.3,pp.147-142,2005.

[2] D.Scarstein and R.szeliski " A taxonomy and evaluation of dense two-frames stereo correspondence algorithm; internal journal of computer vision , vol. 47,no.1,pp.7-42,june 2002.

[3] Z.zhang," A Flexible New technique for camera calibration ," IEEE Transaction pattern analysis and machine intelligence (PAMI).vol.22.no.11.pp.1330-1334.oct.2000.

[4] A.Wang,T.Qiu,and L.Shao,"A simple method of radial distortion correction with centre of distortion estimation" Journal of mathematical imaging and vision vol.35,no.3, pp.165-175,July 2009.

[5] Z.Zhang,"A flexible New technique for camera", IEEE Transaction on pattern analysis and machine intelligence (PAMI), Vol.22, no.11,pp.1330-1334,oct.2000.

[6] O.Veksler," stereo correspondence by dynamic programming on a true," int. conf:comput.vis.pattern Reccognit;san-Diego,CA,USA,Vol,pp.384-390,June 2005.

[7] Maitre H., Luo W., using modes to improve stereo reconstruction. IEEE Transaction on pattern analysis and machine intelligence, 14(2):269-277,1992.

[8] Papadimitriou D.V., Dennis T.J., Epipolar line estimation and rectification for stereo image pairs,IEEE trans.on image processing, Vol.5(4),1996.

[9] O. Veksler, "Stereo correspondence by dynamic programming on a tree," *Int. Conf. Comput. Vis. Pattern Recognit.*, San-Diego, CA, USA, vol. 2, pp. 384-390, June 2005.

[10] "Confidence evaluation for robust , fast-converging disparity map refinement j ¨ orn jachalsky , markus schlosser , dirk gandolph 3d video

lab , technicolor research & innovation," innovation, pp. 1399-1404, 2010.

[11] "Disparity map generation for color image using tof depth camera yun-suk kang and yo-sung ho gwangju institute of science and technology ( gist ) e-mail : { yunsuk , hoyo }@ gist . Ac . Kr," science and technology, vol. 1, no. C, pp. 1-4.