Anaglyph Decomposition using Disparity map

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(a) (b) (c)

Figure 1: *(a) Anaglyph Image (b) Obtained Right Disparity Map (c) Restored Right Image*

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1 Introduction

Anaglyphs are the most primitive way of representing stereoscopic images. As one of the first attempts to produce 3D images, its viewing experience is not as satisfying as later methods but it is still widely used because of its simplicity and compactness. An anaglyph image is created by simply superimposing the red channel of the left image with blue and green channels of the right image. If an anaglyph image can be decomposed into its original left and right images, it can be used for compression as well as for conversion to other, more recent 3D viewing methods.

An anaglyph image can be restored into its original images with an accurate disparity map, but it is not easy to obtain an accurate disparity map. Since most of the existing stereo-matching algorithms use RGB color information as a basis, they are not applicable to an anaglyph image, which has some missing color channels.

In this work, we propose a method to acquire the disparity map between the incomplete left and right images extracted from an anaglyph image. We use the color alignment measure combined with the census transform and gradient of the image. The original images are restored using the resulting disparity map.

2 Our Approach

Given an anaglyph image(Figure 1(a)), we can extract the left image containing red channel and the right image containing the blue and green channel. For each pixel, we calculate the matching costs using the color alignment measure, census transform and gradient. The color alignment measure [Bando et al. 2008] assures pixel colors within a local window to form a elongated cluster. The census transform [Zabih and Woodfill 1994] is a measure that encodes the local structure according to its pixel intensities, defined over a 9x7 window in our case. The gradient of an image is simply computed over the left and right grayscale images.

Given a pixel $p = (x,y)$ in the right image and a disparity d, the corresponding matching cost for the left image at pixel $(x,y+d)$ is computed as :

$$C(p,d) = \alpha CAM(p,d) + \beta Cen(p,d) + \gamma Gr(p,d)$$

Where *CAM* is the color alignment measure, *Cen* is the census transform and *Gr* is the gradient of the image. The coefficient α , β and γ decides the ratio of each measures. The resulting costs for the disparity map is optimized using standard graph cuts technique to impose smoothness.

3 Conclusion

We proposed a method to obtain the disparity map(Figure 1(b)) from extracted left and right images using the color alignment measure, census transform, and gradient. With this disparity map, we can restore the original image(Figure 1(c)).

In future work, we will aim for a more accurate disparity map. Additionally, since it is practically impossible to obtain a perfect disparity map from an anaglyph image, we will work on the post-processing of restored images to identify erroneous regions and redistribute the disparity depending on the color or disparity of the neighboring pixels. A comparison with existing work [Lin et al. 2012] is also planned.

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