Moving Object Removal/ Motion Reconstruction in Stereo Panoramas

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1 Project Description

1.1 Introduction

Ghosting is a common problem in panoramic images. When we generate a stereo panorama image while there are some objects moving in the scene, the moving objects are very likely to leave a set of irregular path/ ghost shadows on the image. As we can see from the figure below, the ghost shadows seriously affect the quality of stereo panorama images.

Several methods have been proposed to eliminate ghosting artifacts [2] [3]. Basic steps include: (1) detect and label moving objects [4]. (2) remove moving objects. (3) hole refilling after object

removal [1]. In this project, we plan to play with the moving objects in stereo panorama images. Our first step is to apply and improve different moving object detection and removal techniques to the stereo panorama setup. There are already some related works about moving object removal be done on single panorama images or videos [3]. However, due to the different setting of stereo panorama camera and the way stereo panorama images are generated, there are some new challenges. The goal for this step is to come up with an effective method to remove irregular/ghosting objects from panorama images while filling removed object regions and maintaining the quality and information of the original image.

For the second step, we would like to dig deeper into the features of stereo camera and explore a way to reconstruct the motion of the object in the stereo panorama instead of removing it. There are several different directions that we can explore on this step. For example, we may use the stereo camera to reconstruct the parallax effect such that we can mimic the translation on viewer's sight. Or we can focus on how the moving object moves and reconstruct its moving path. We will do some further research on what else we can do on this part while finishing the first step.

2 Milestone

1. Finish moving object removal and completion by Nov.13th.
2. Finish the motion reconstruction of moving object in panorama by Dec.7th.

3 Use Android Device: No

References

[1] C. Jason, C. Nick, T. C. Tang, et al. Exemplar-based image inpainting base on structure construction. 2008.

[2] M. Uyttendaele, A. Eden, and R. Skeliski. Eliminating ghosting and exposure artifacts in image mosaics. In *Computer Vision and Pattern Recognition, 2001. CVPR 2001. Proceedings of the 2001 IEEE Computer Society Conference on*, volume 2, pages II–509. IEEE, 2001.

[3] Y. Xiong. Eliminating ghosting artifacts for panoramic images. In *Multimedia, 2009. ISM'09. 11th IEEE International Symposium on*, pages 432–437. IEEE, 2009.

[4] X. Zhou, C. Yang, and W. Yu. Moving object detection by detecting contiguous outliers in the low-rank representation. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 35(3):597–610, 2013.