

Multi Camera Surveillance System for Ground Detection

XU YONGZHE¹, Byungsoo Lee²

^{1,2}Department of Computer Engineering, University of Incheon, Korea
yongzhxu@hotmail.com¹, bsl@incheon.ac.kr²

Abstract. CCTV surveillance camera systems are commonly used in human society today. From Camera video data give user rich information about the surveillance area. In this paper we present surveillance camera system detection ground, human, and transform it's to 3D space. The key point in the system is after 2D feature point matching, to reconstruction to 3D ground model to surveillance camera system. In experiment environment used simple background, that allows the quickly and easily to computing time and discount of error matching result. Also Transform ground coordinate to user 3D environment ex) game engine, simulation tool, and CAD.

Keywords: SFM, Surveillance camera, Object detection, object reorganization.

1 Introduction

Recent, more and more video surveillance system cameras are installed every day. Surveillance camera system is very commonly today. For example, Las Vegas casino installed more than 1,700 cameras [1]. Big Brother in China is watching there people, with 20 to 30 million surveillance cameras in the country. Since 2005, Chinese government has been installing surveillance cameras throughout the country, which now total around 20 to 30 million, according to National Public Radio. According to NPR, cameras are located in every conceivable location, from highways and taxis to sports stadium stands and outside people's homes. They have also been installed in religious buildings to monitor people worshipping. Accordingly, in this paper, the proposed method, tracking human, detection ground, and reorganization object position information with multi camera surveillance system.

2 Related Work

From paper "Detailed 3D Representations for Object Recognition and Modeling" main algorithm is like image 1 find point cloud data set[2]. After find object world coordinate detection tracking object from single camera [3], [4] and [5]. Detection object they using object detection algorithm. This algorithm matching part based on hog, sift, surf.

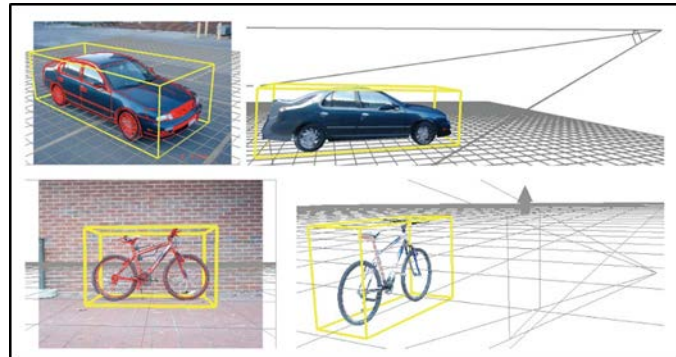


Fig. 1. Figure 1. Cloud Point feature detection from 2D image

2.1 Main algorithm Feature point matching

Image 2 show main algorithm feature point matching the step 1st is from input device capture target object. 2nd find features from object. 3rd matching all these feature point. The last step structure from motion find same feature point and mark it and transform plane coordinate to surveillance system world position coordinate. After previous step camera 1, 2 focusing object of world transform(X, Y, and Z) left camera and right camera detection object divide object to small block. Object block silhouette matching to 3D environment. it shows object block structure these points coordinate in 3D environment [6][7].

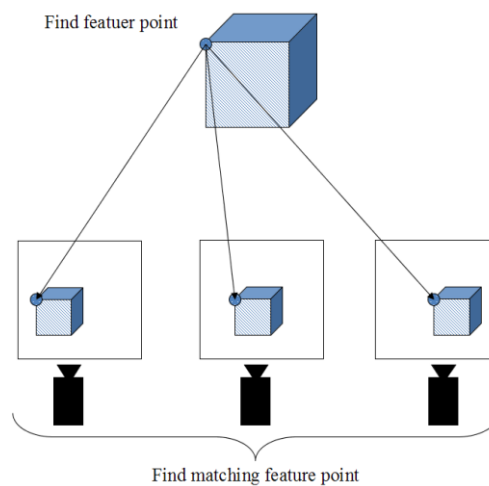


Fig. 2. Cloud Point feature detection from 2D image

3 Proposal Algorithm

The research goal and necessity is to exploit the information of 3D Reconstruction SFM[8]. SFM (structure from motion) is rebuilding 3D geometric from multi 2D images. We focuses on 3D recognize and matching algorithm. Algorithm main target is from 2D image object silhouette find object pose (Target Object X, Y, Z world coordinate). And compute object position to find about surveillance ground. After compute object pose easy to compute and reconstruction ground. Detection ground finds wall, building and other static object. Transform these objects coordinate to 3D environment ex) game engine, simulation tool, and CAD.

4 Experiment Result

In this paper we used i5 3230m GTX 740M MSI Notebook to computing proposal algorithm. figure 3 Image 1, 2 detection ground, but in image 3 and 4 illumination noise too heavy so find some error. Illumination problem made ground like wall and that red cycle place need user to setting in video and input ground world position to it.



Fig. 3. Surveillance Video Experiment Result

5 Conclusion and Future Work

In this paper proposal algorithm from input surveillance camera system computing object world coordinate transform to surveillance system world coordinates. Use coordinates information recognition object, and future work it is reconstruction in 3D

environment. main goal is find ground, wall and building. These detection information improve surveillance system tracking moving object, illumination condition.

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