Parallel Tracking and Mapping for Small AR Workspaces

Christian Cordova Estrada
Research and Innovation
Center in Computer Science
Email: christian.cordova@ucsp.edu.pe

Zoser Quenaya Hinojosa
Research and Innovation
Center in Computer Science
Email: zoser.quenaya@ucsp.edu.pe

***Abstract*—The main objective of the document is to present a method to know the stimating camera pose from having known their you have found the camera matrix and distortion coefficients (intrinsic and extrinsic parameters). A specific system is proposed to design a track in small cameras within a small environment for augmented reality. To do this, it is proposed to divide this system into two parallel tasks, the first one includes the tracking part (tracking of the frames captured by the camera) while the second task produces a 3D point map with the frames already observed previously. The final result will be a system that produces 3D maps with hundreds or even thousands of landmarks that will be tracked according to the frame rate.**

1. Introduction

Generally, to develop an Augmented Reality (AR) system you need some kind of map where you can interact. The tracking is limited to the times in which certain characteristics can be measured with some type of sensor, being able to limit the quality and even the range of the record. Due to these limitations, techniques known as **extensible tracking[1]**, have been developed, which is to track within the scenes without any previous map.

One of the goals here is to track a calibrated hand-held camera from an initially unknown scene and from it build a map of this environment. Once the initial map has been built, it will be useful to insert virtual objects within the scene and should be adapted to the real objects present in the environment.

This document deals with the generated map (as a dominant plane) in order to generate virtual simulations, we can visualize it in the *Figure 1*. So that the user can interact in a better way with the simulation, it is necessary to follow a camera that is fast and precise, the scene must be non-deformable and small. This last characteristic refers to the fact that most of it will focus specifically on one place.

February 08, 2018

2. Related Work

We notice that **[2]** have recently described a system which also employs Structure-from-Motion (SfM) techniques to map and track an unknown environment - indeed, it also employs two processors, but in a different way: the authors decouple 2D feature tracking from 3D pose estimation. Robustness to motion is obtained through the use of inertial sensors and a fish-eye lens. Finally, our implementation of an AR application which takes place on a planar playing field may invite a comparison with **[3]** in which the authors specifically choose to track and augment a planar structure: It should be noted that while the AR game described in this system uses a plane, the focus lies on the tracking and mapping strategy, which makes no fundamental assumption of planarity.

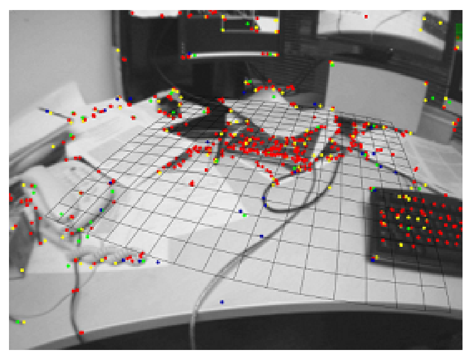

Figure 1. Desktop tracked, a generate map contains close to 3000 point features, of which the system attempted to find 1000 in the current frame.

References

[1] G. Bleser, H. Wuest, and D. Stricker. Online camera pose estimation in partially known and dynamic scenes. In Proc. 5th IEEE and ACM International Symposium on Mixed and Augmented Reality (ISMAR 06), San Diego, CA, October 2006.

[2] R. Koch, K. Koeser, B. Streckel, and J.-F. Evers-Senne. Markerless image-based 3d tracking for real-time augmented reality applications. In WIAMIS, Montreux, 2005.

[3] G. Simon, A. Fitzgibbon, and A. Zisserman. Markerless tracking using planar structures in the scene. In Proc. IEEE and ACM International Symposium on Augmented Reality (ISAR00), Munich, October 2000.