Visual Odometry Pipeline

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January 4, 2017

Sandbox

Figure 1: Cute pig image

Symbols, Nomencalture

Introduction

The aim of this mini project is the development of a visual odometry pipeline. This pipeline takes the consecutive gray-scale images of a single digital camera as input. Therefore the pipeline developed in this mini project is a monocular visual odometry pipeline.

The output of the pipeline is the position of the camera in relation to its initial position for each frame.

keywords: (VO, sequential, monocular, markov assumption)

Implementation

Framework

(keywords: MATLAB, Git)

Coordinate Frames

In this mini project the coordinate frames were defined as shown in fig. 2. The camera coordinates are in a way oriented, that the x-y plane lies parallel to the image plane, while the z-axis is pointing towards the scenery. The world frame however is oriented in such a way that the x-y plane is parallel to the ground and the the z-axis is pointing upwards.

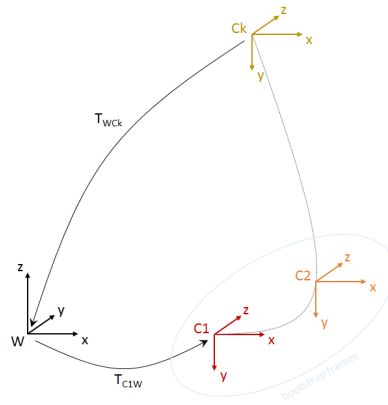The origin of the world frame is at the same location as the origin of the first boot-strap image.

Figure 2: Coordinate Frames

Pipeline overview

As shown in fig. 3 the pipeline consists mainly of three parts, a bootstrap, the initialisation and the continuous operation. In section 4.2 and section 4.3 the initialisation and the continuous operation are described in detail.

Options and parameters

(keywords: parameter handling, GUI)
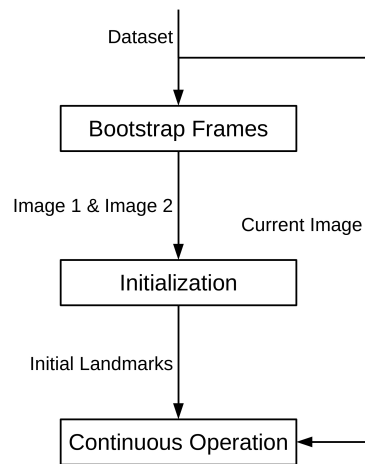
Initialization

Continuous Operation

Figure 3: Rough Flow chart

Results

Overall performance

(keywords: Real time ness, comparison to groundtruth, compare different datasets Impact of features)

Discussion

What have we learned, what worked?
    Possible future work, improvements (loop closure, ...)

Conclusion

Figure 4: Init Flow chart

Figure 5: Cont Flow chart