

# Distance Measurement and Target Extraction Based on Binocular Vision

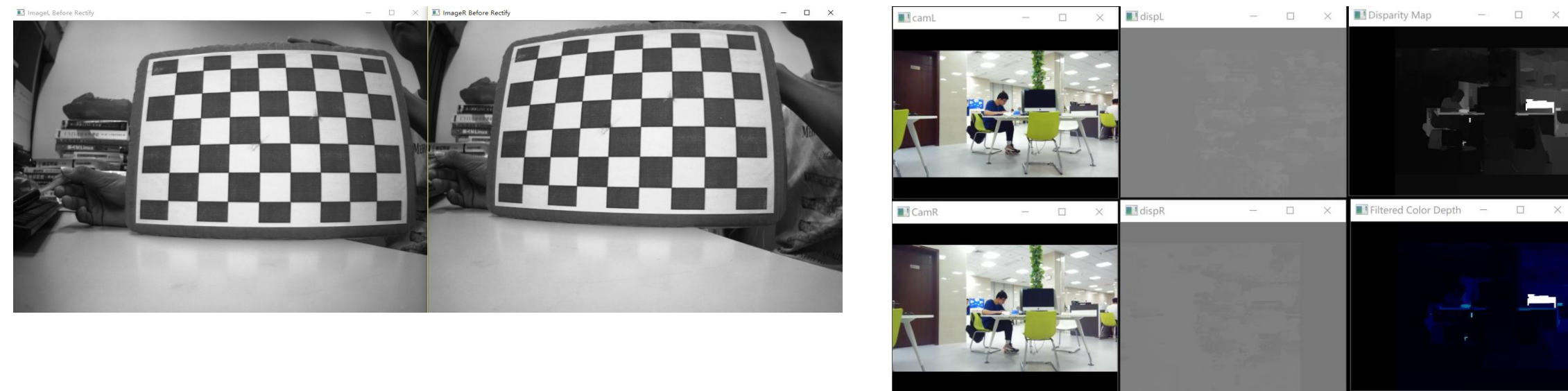
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## Introduction

In this project, we use a dual-camera to measure distance by parallax and further extract foreground targets. This function can be used for data analysis and real-time tasks, finding applications in entertainment, engineering, healthcare and more.

## Our Work

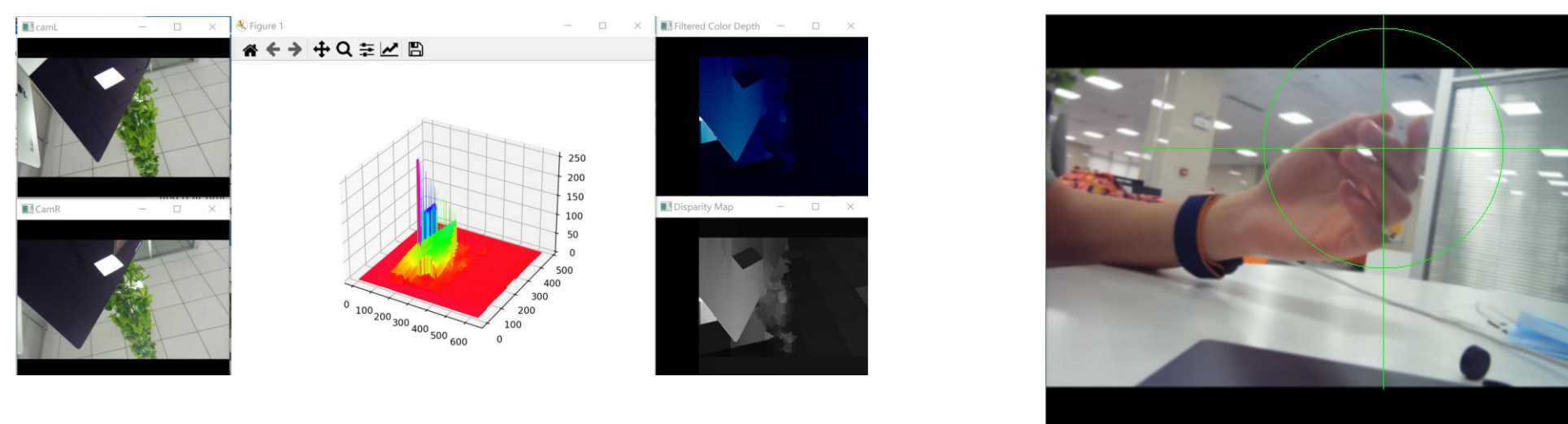
1. Take large number of checkerboard photos to obtain parameters for orthodontic treatment.



2. Use wls filter and closing filter to get better disparity map.

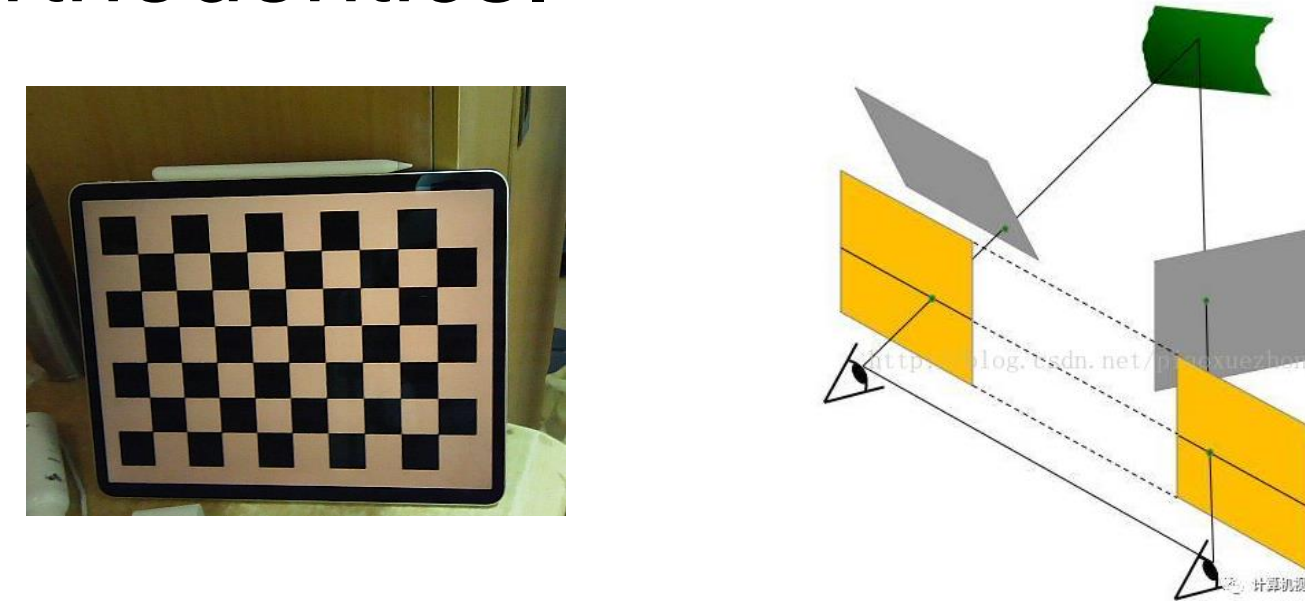
3. Build 3D model by depth map, which is not rigorous but obvious to see the depth.

4. We use threshold and edge detection method to extract the most significant foreground target.

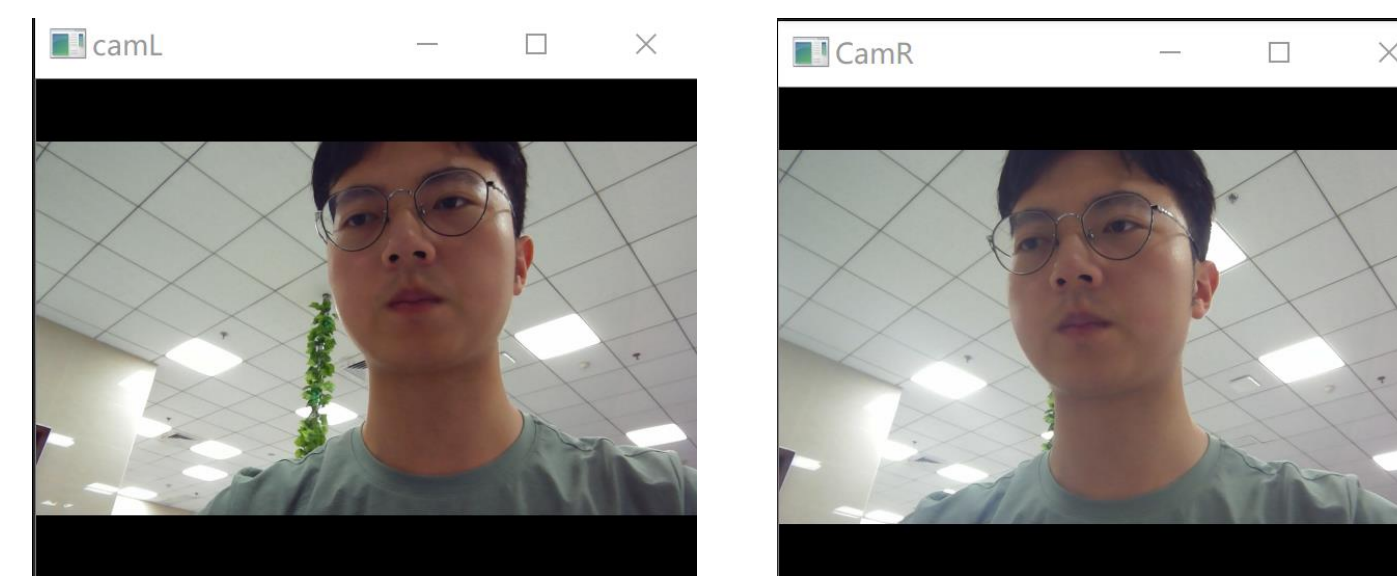


## Implementation

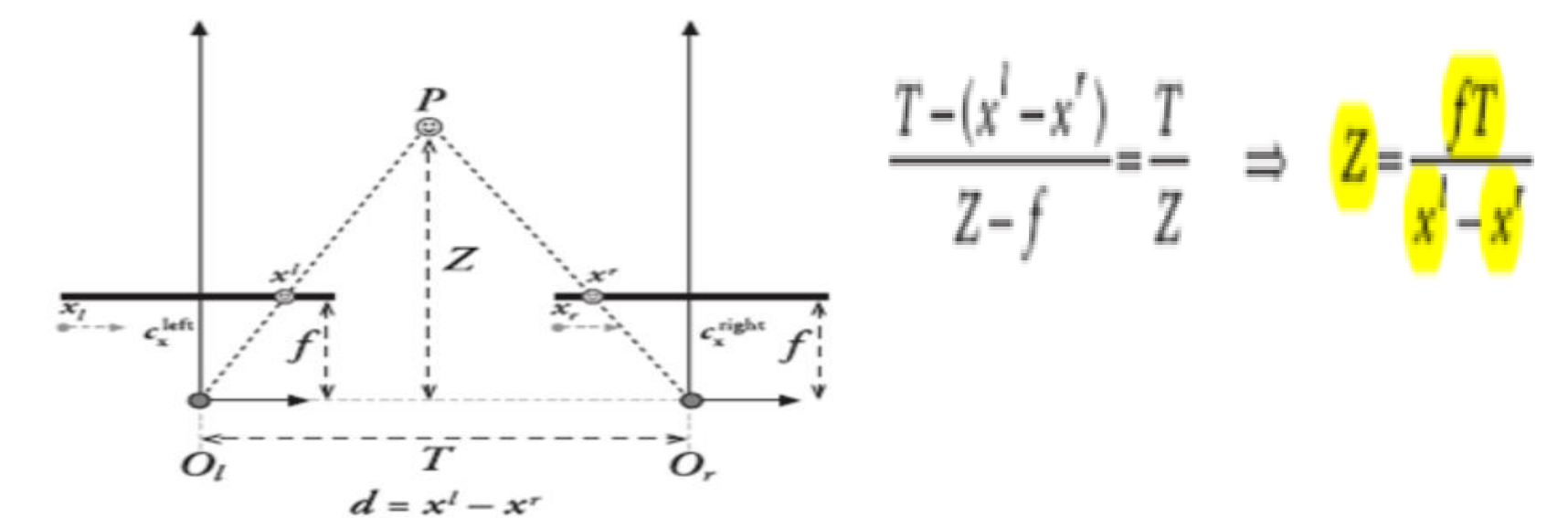
1. Binocular calibration. The binocular camera is used for checkerboard orthodontics.



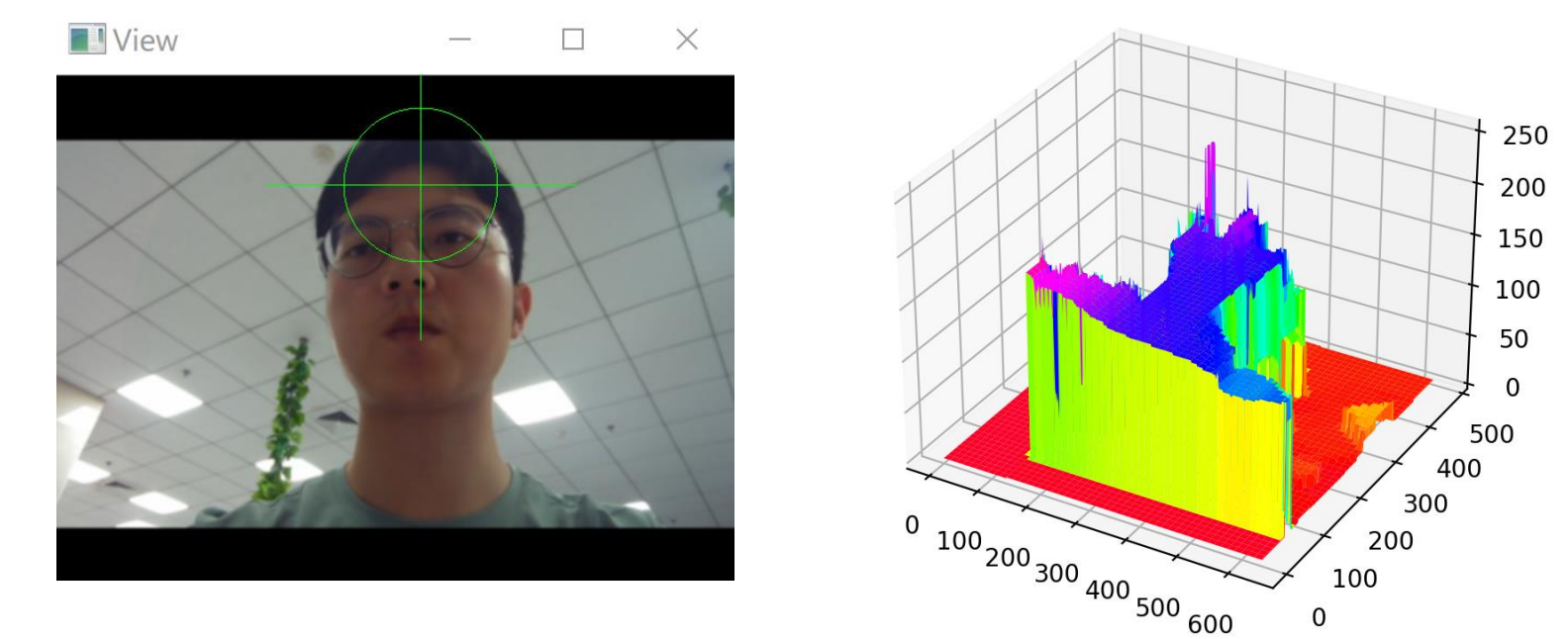
2. Stereo matching. Match left and right images.



3. Calculating depth map and binocular ranging.



4. 3D display on the basis of depth map.



5. Extract the foreground target.

## Result Analysis

1. The distance measurement: 10% error in the range of 0.25m to 1m. Can not work beyond 3m and within 0.2m.

2. Our algorithm can extract a single, clear, large proportion of the target object, for multi-target, complex structure, the object is too close and too far away, there are unrecognizable, error ranging situation. This mainly needs the further optimization of the matching algorithm.