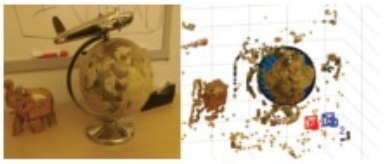
Lehrstuhl für Multimediakommunikation und Signalverarbeitung
Universität Erlangen-Nürnberg

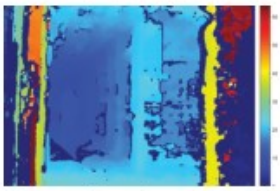
Proposal for a research internship on
Evaluation of Camera Calibration Toolboxes

Modern computer vision applications, e.g., 3D reconstruction, measurement, robotics, or multi-view processing, stand and fall with the accuracy of the foregoing camera calibration. The result of the calibration directly influences the relation between image pixels and the geometry of the recorded scene, thus it must be as accurate as possible.

Typically, the calibration process estimates the camera-specific parameters of a given model, such as pin-hole, or fisheye. Parameters of interest are, for example, focal length, pixel aspect ratio, optical center, lens distortion, etc. Only a well-estimated model describes reasonable relation between the scene and the resulting image.

Remove Lens Distortion


Estimate 3-D Structure from Camera Motion


Estimate Depth
Using a Stereo Camera

Measure Planar Objects

Alongside the development of computer vision applications there has been done a lot of research in the aspects and techniques of camera calibration, recently. For the end user there exist several toolboxes for calibrating their cameras. These toolboxes implement more or less different calibration approaches.

The goal of this internship is to make use of different common toolboxes and evaluate them under certain test conditions. Those toolboxes shall be compared to each other, concerning usability, scope of application, and of course, the resulting calibration accuracy.

The tasks of this work include:

- Selection of the most relevant toolboxes
- Investigation of the underlying techniques for calibration
- Rendering of ground truth test images for use with the toolboxes
- Comparison of the toolboxes and their calibration results

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Prerequisites: Matlab and C++ programming

Available: Immediately