

Concept Review

Calibration Images

Why use a Calibration Image?

Modern cameras are electromechanical devices which convert visible light into digital images. The first part of a camera interfacing process is to calibrate images which were created using lenses with high distortion. Calibration yields parameters such as the focal length and principal point of the camera, and can be used to determine an intrinsic matrix, which maps real world points into pixel coordinates. A calibration image allows you to compare models and sensors with a standardized approach.

Chess Board

One of the most common calibration tools for cameras while trying to determine characteristics such as focal length, principle point as well as distortion parameters is a chessboard type of pattern,

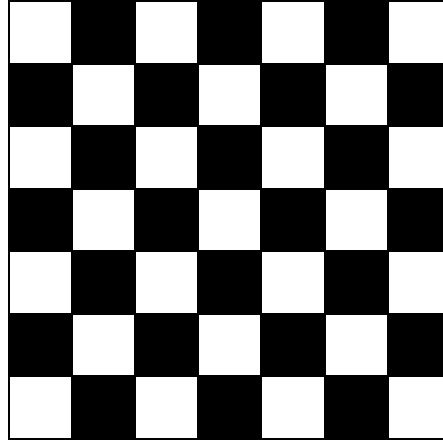


Figure 1. Example chessboard calibration pattern size (7,7).

Important information about the grid:

- The actual size of each grid cell (specified in SI Units) - this is the side length of each individual cell (black or white), and will hold information about how many pixels a 1 m length object projects onto in an image plane
- The internal grid in the chessboard pattern - in figure 1, full grid size is (7,7), while the internal grid is size (5,5)

You can create yourself a chess board grid for calibration by using a rigid piece of cardboard and gluing on a chessboard. Find a sample version here - [link](#).

Camera Calibration requires a sequence of images captured from the camera of interest so as to continuously refine an estimate for the camera intrinsic matrix and lens distortion parameters. Capture multiple images that satisfy the following two conditions,

- The entire chessboard must be visible in the captured image
- The chessboard should be in different locations and orientations across the captured images

Color Tool

Cameras can be understood as color sensors, each of which responds differently to lighting. The efficiency at which the camera turns photons from light into electrons varies based on the wavelength of the light, which determines the color of the light as well. Often a standard image with multiple colors can be used. One such image is the Macbeth color chart with 24 squares.



Figure 2. Macbeth color chart

Other popular images

The computer vision community also uses certain images commonly, some of which are listed below. These can also be found embedded in common



a. Lena (Forsen)



b. Peppers

Figure 3. Common images used in Computer Vision



© 2022 Quanser Inc., All rights reserved.

Quanser Inc.
119 Spy Court
Markham, Ontario
L3R 5H6
Canada

info@quanser.com
Phone: 19059403575
Fax: 19059403576
Printed in Markham, Ontario.

For more information on the solutions Quanser Inc. offers, please visit the web site at:
<http://www.quanser.com>

This document and the software described in it are provided subject to a license agreement. Neither the software nor this document may be used or copied except as specified under the terms of that license agreement. Quanser Inc. grants the following rights: a) The right to reproduce the work, to incorporate the work into one or more collections, and to reproduce the work as incorporated in the collections, b) to create and reproduce adaptations provided reasonable steps are taken to clearly identify the changes that were made to the original work, c) to distribute and publicly perform the work including as incorporated in collections, and d) to distribute and publicly perform adaptations. The above rights may be exercised in all media and formats whether now known or hereafter devised. These rights are granted subject to and limited by the following restrictions: a) You may not exercise any of the rights granted to You in above in any manner that is primarily intended for or directed toward commercial advantage or private monetary compensation, and b) You must keep intact all copyright notices for the Work and provide the name Quanser Inc. for attribution. These restrictions may not be waived without express prior written permission of Quanser Inc.