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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,

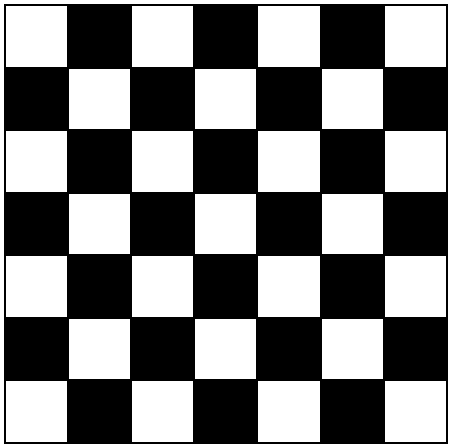


Figure 1. Example chessboard calibration pattern size (7,7).

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 carboard 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

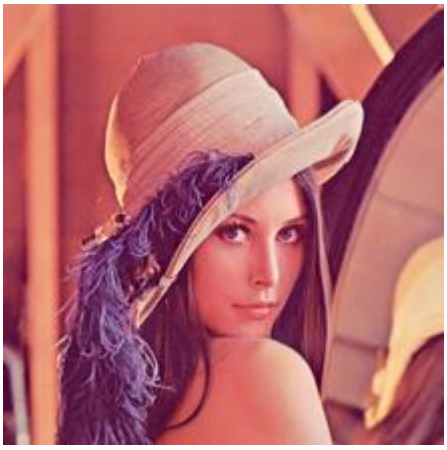
Color Tool

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

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