Mobile Robotics

Camera Calibration

Roll no. 20161103

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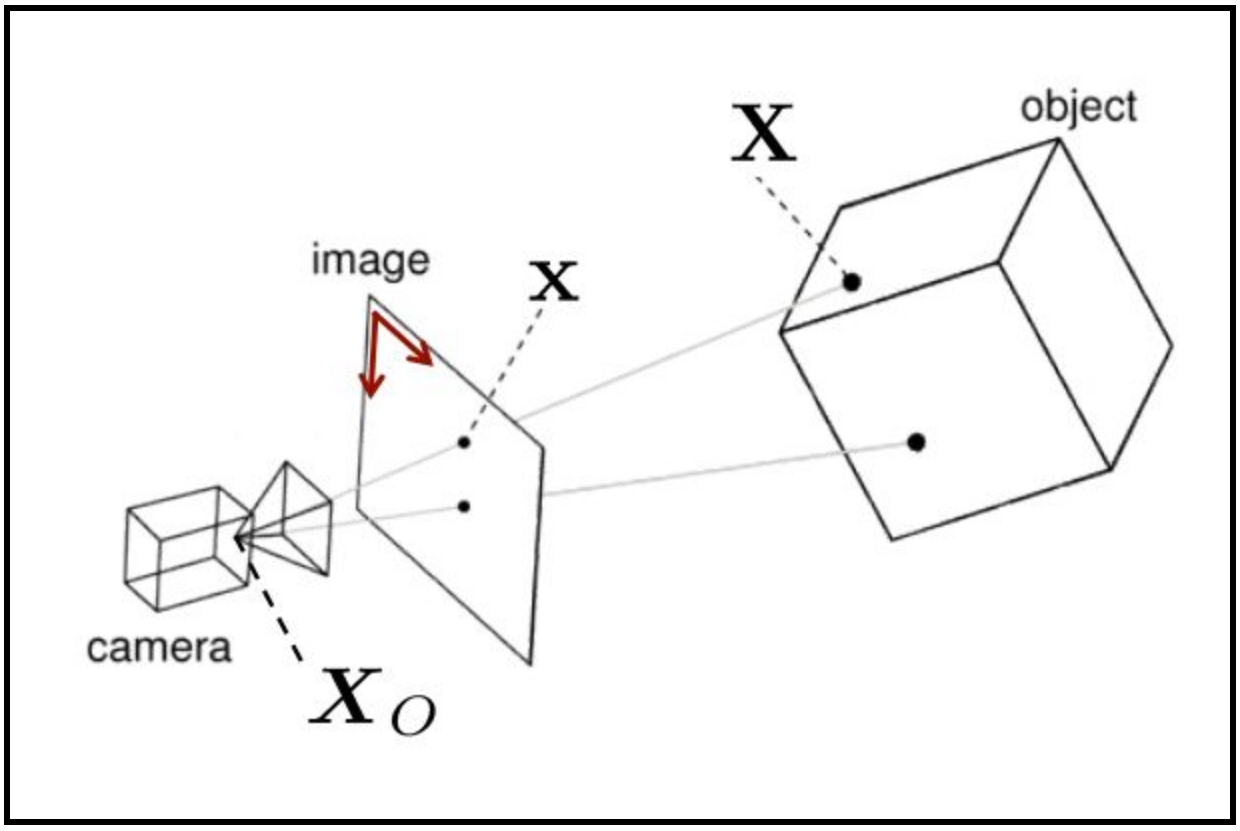
Introduction:

Camera calibration is the process of computing a camera's internal properties such as focal length, lens distortion coefficients. We use the ideal pinhole model



Possible Applications

- Camera calibration (obtain intrinsics)
- Estimating the pose of a camera given knowledge about the 3D scene
- Estimating the object location given the known pose of a camera

Implementation:

1. Used the Zhang method to find the camera calibration
2. Used only the minimum required images, i.e. 3 images
3. Extracted the corners and got the world coordinates and the image coordinates
4. Used the DLT method to first compute the homographies
5. Used the DLT method to then compute the B matrix which on Cholesky decomposition gave the K matrix
6. Computed the rotation and translation matrix using K (Bonus)

Result:

```
Output
K (Intrinsic Matrix)
  536.1700   -7.7629  306.4894
    0.0000  539.7244  234.3294
    0.0000   -0.0000    1.0000

Rotation Matrix of Image 1
   -0.0114    0.0225    0.0487
   -0.0224   -0.0113    0.0451
    0.0016   -0.0006    0.9978

Rotation Matrix of Image 2
    0.0162    0.0062    0.4446
   -0.0098    0.0139    0.4544
   -0.0036   -0.0118    0.7720

Rotation Matrix of Image 3
   -0.0036    0.0335    0.3194
   -0.0330   -0.0074    0.3102
    0.0127   -0.0094    0.8954

Translation Matrix of Image 1
    0.1666
    0.1574
    1.0000

Translation Matrix of Image 2
    0.1666
    0.1574
    1.0000

Translation Matrix of Image 3
    0.1666
    0.1574
    1.0000
```