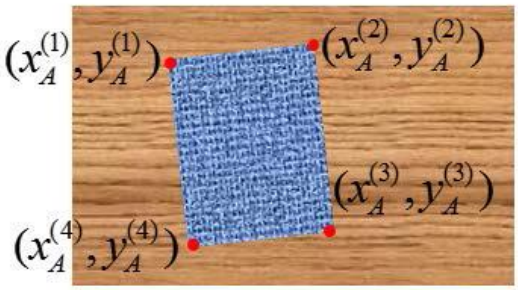
MINES-VIS Assignment 12 Image Transformation using least square estimation.

In many imaging systems, detected images are subject to geometric distortion introduced by perspective irregularities wherein the position of the camera(s) with respect to the scene alters the apparent dimensions of the scene geometry. Applying an affine transformation to a uniformly distorted image can correct for a range of perspective distortions by transforming the measurements from the ideal coordinates to those actually used. (For example, this is useful in satellite imaging where geometrically correct ground are desired.)

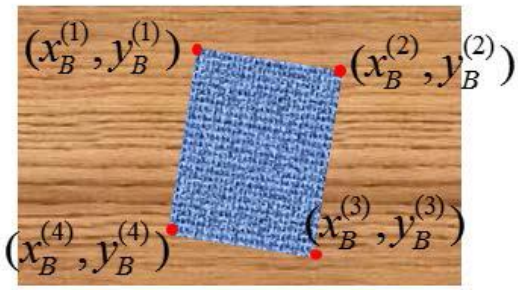
Exercise (1)

Collect minimal a set of 4 point correspondences of the book on **"imageA.jpg"** and **"imageB.jpg"** and estimate the parameter of the transformation by **using least squares estimation** as shown in the class. $Ax = b, \quad \hat{x} = A^{-1}b$

OpenCV has a rich library containing a lot of matrix functions i.e. Inverse Matrix A^{-1} or Transpose a matrix A^T.



"A"



"B"

All these images can be found on SharePoint.

Exercise (2)
Take the difference between imageA.jpg and the result of transformation of imageB.jpg and show your results.

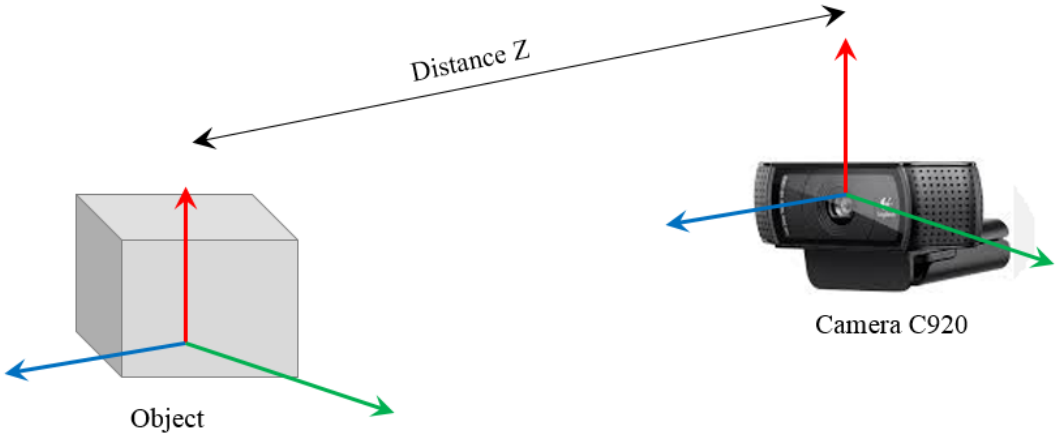
Camera Calibration. Assignment 12 part 2

Exercise (3)
Watch the videos **"Cam_calib_video1.mp4" "Cam_calib_video2.mp4"** and read the following online document about camera calibration using a chessboard. You might also want to read this document for more information about (intrinsic or extrinsic) parameters of a camera. You can borrow a webcam C920 of Logitech from ISSD. The images shown in the video cannot be used for your webcam (they were not taken by your webcam!)

You must hand in a well-documented source code containing, the transformation matrix of exercise (1) and the result of the difference between the images as described in exercise (2).

For exercise (3) You must present your calibration results. To validate your results, use the obtained intrinsic parameters to estimate the distance of an object as shown in the following figure.

Give a demo to proof your results!



This assignment, the first part, must be handed in before November the 25th 2016.