MINES-VIS Assignment 8 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} .
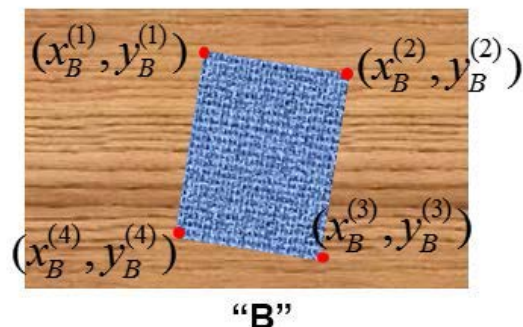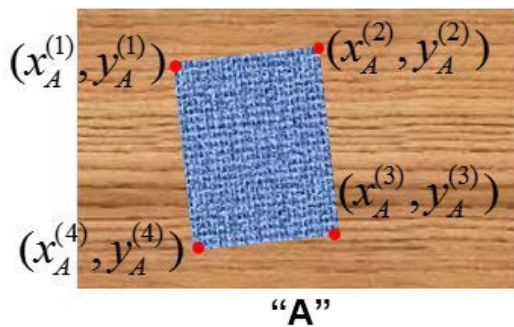
All these images can be found on SharePoint.

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

Camera Calibration.

Preperation for Exercise (3)
Watch the video **"video7_1.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.

For exercise (3) You must mention the camera type (e.g. brand name) that you have used. Try to validate your results , like the focal length of your webcam. Assignment will be published soon.

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).

This assignment must be handed in before November the xx[th] 2016.