1.

    (a). Write a program to compute the projection matrix from a given set of 2D-3D point correspondences by using the least-squares (eigenvector) method. The 2D-3D correspondence data is available from the course homepage.

    (b). Decompose the computed projection matrix from (a) into the camera calibration matrix, rotation matrix and translation vector to obtain the camera intrinsic parameters (calibration matrix K) and extrinsic parameters (rotation matrix R and translation vector t) by using the Gram-Schmidt process.

    (c). Compute the average point re-projection error by using (i) the computed projection matrix, and (ii) the calibration matrix, rotation matrix and translation vector. Discuss your results.

2.

    The right image is taken from Ximending street. Use the homography transformation H (projective plane transformation) to develop your program to switch between the left poster (Captain Phillips) and the right poster (The Hunger Games).

    (a). Show the homography H that maps a point in the left poster to the corresponding point in the right poster.

    (b). Warp the left poster to replace the right image and warp the original right poster to replace the left poster.