PART2: FUNDAMENTAL MATRIX COMPUTATION AND TRIANGULATION

Given: 1. two images I1.jpg I2.jpg
Calculate: Fundamental Matrix

Estimate Fundamental Matrix: with normal 8 corresponding points

Normalizing coordinates:
% these steps were explained in the file

Calculating the mean.
Subtracting mean from the coordinates.
Calculating distance (d) from the origin.
Taking root (2)/d scale.
Making Transformation matrix.
Multiply Transformation matrix from the image points.

Putting (x1)T * F *x2 = 0
kron product.
SVD and extracting the last column(V)
Resultant = Estimate fundamental matrix.

RANSAC Method:
Calculating maximum iterations by using
log(1-p) / log(1-(1-e).^s)

Take Random Points and calculate the Fundamental Matrix.
Calculate the inliers and outliers.
The one with the maximum inliers is our answer .
In my file with ratio > 0.8 selected there was 98% accurate model obtained kindly check

Given: Corresp. Image coord, Intrinsics of the camera,Rotation and translation of the cameras.
Find out the Fundamental Mat, 3D coordinates of the points, Re-projection error.
Fundamental Matrix:

Formula:

F = K_inverse_transpose * R_one * sb * R_two_transpose * K_inverse
Resulting Fundamental Matrix:

Verification:
The verification of the fundamental matrix is done by taking the corresponding points and finding
out
(x1)T * F * x2=0;

The result is been compared with 10^(-10) and if it is greater than this quantity for any
corresponding two points it gives an error saying “Wrong fundamental matrix” otherwise it display
“Correct fundamental matrix”.3D coordinates:
This is been done by using algebraic method of triangulation, as we see that
x = P*X
P = [(A)T
(B)T
(C)T]

Than x*C_transpose*X – A_transpose*X = 0
y*C_transpose*X – A_transpose*X = 0
Similarly for the second coordinate:
Than calculate the 3D coordinates using SVD.
Hence take out the last column of V and normalize that to get the value of 3D coordinates.
In this way you get 56 3D points, ploting that will give:
Re-projection error:

This is been calculated by comparing the coordinates of the 3D cube from which the projection is
taken with that of the reconstructed cube by adding the distance between each of the points and then
comparing the error with 10^(-10), if more than it display “Re-projection error”, else displays “No
Re-projection error”.