CSE/ECE 344/544: Computer Vision
Assignment-5

Instructions

- Please complete all questions.

- Keep collaborations at high level discussions. Copying/Plagiarism will be dealt with strictly.

- Start early, solve the problems yourself. Some of these questions may be asked in Quiz/Exams.

- Submission: Report all your results in a single pdf, put your report and code in a single zip folder following naming convention $name - rollno - asmt5.zip$ and submit on backpack.

- Late submission penalty: 50% credit per day.

1. (25 points) Unzip $q1data.zip$.

   (a) (10 points) Implement normalized 8-point algorithm for fundamental matrix estimation. (Refer Algorithm 11.1 from the Hartley and Zissermann's book). Consider point matches in *data-without-outlier* to estimate the fundamental matrix. Report the fundamental matrix.

   (b) (5 points) Plot any 10 epipolar lines for the above case.

   (c) (10 points) Suppose I have added 184 outliers to the data, now consider the polluted data *data-with-outlier* to estimate the fundamental matrix. Report the fundamental matrix. You might need to modify the above eight-point algorithm and use RANSAC for robust estimation. How many RANSAC iterations do I need to run to have a 99% probability of success (i.e computing a fundamental matrix from all eight inliers at least once)?.

2. (5 points) A non-zero matrix F is the fundamental matrix corresponding to a pair of camera matrices P and Q if and only if $Q^T \text{FP}$ is skew-symmetric. If the previous statement is true, prove it, otherwise give a counter-example.