A1 Considerations

The steps to do for A1 are listed below. If you have questions, let me know.

1. Develop Matlab functions.
2. Once they are working, come up with a question concerning the camera function; e.g., I proposed: "How sensitive is the projection to the camera parameters?"
3. Figure out a way to answer this question; e.g.:
    a. Fix a set of parameter values (say: alpha = 1, beta = 1, theta = pi/2, x0 = 0, y0 = 0, R = Identity, t = [0,0,0]^T)
    b. For each parameter, run a set of trials (e.g., 100), and add Gaussian noise to the parameter; i.e., add noise to the parameter, then project the set of known points, then record the error in position in the image.
    c. Determine the mean and variance of the error. If possible, give confidence intervals on the mean (see Confidence_Intervals.pdf on course web page link "Course Info and Documentation").
4. Write the A1 lab report (see lab-criteria.pdf on course web page link "Course Info and Documentation"):
    a. Intro: describe general problem (camera projective projection model), and questions to be explored.
    b. Method: Describe algorithms developed (pseudo-code), and the way the question will be answered (i.e., from 3 above).
    c. Verification: show that functions you wrote are correct (i.e., give answer developed by hand and compare to result from function). For example, a call to CS5320_gen_R with arguments u = [0;0;1] and theta = 0 should give the identity matrix.
    d. Data: In this lab, the data could be a few points that go through the camera function (i.e., give world coordinates and image coordinates), and a plot of the errors found in the trials (e.g., x-axis is trial number and y-axis is error in points in that trial).
    e. Analysis: Compute statistics of interest (e.g., mean and variance of error for alpha trials).
    f. Interpretation: discuss the results and answer the question (e.g., the error in image position may be proportional to the error in the parameter).
    g. Critique: Discuss ways to improve the experiment (e.g., perhaps more trials, or test points with greater range in Z coordinate, etc.).
    h. Log: Estimate total time spent on assignment.
5. Submit results:
    a. Use handin on CADE to submit all Matlab codes used in the assignment, as well as the A1.pdf lab report.
    b. Bring hardcopy of A1.pdf to class on Wednesday and turn it in.