CE503 Photogrammetry Homework 6
Space Resection

Objective: Determine the elements of exterior orientation for photograph #2-4.

Approach: Use available control points, measure photo locations, use the collinearity equations to solve for the exposure station (X_L, Y_L, Z_L) and the orientation (omega, phi, kappa).

Due: Friday, 12 December

Steps:

- Find the full resolution photograph in \\geomatics\data\bethel\ce603\block\2_4.tif, find a low res browse image in \ce603\blocksm\2_4.jpg
- Look into web pages for CE603 and find control point descriptions for the Purdue block, locate (at least) 4 control points on photo 2-4.
- Measure their locations in the photograph (row, column), etc. From the CE603 web pages, find the camera calibration report. Measure the fiducial marks (row, column) and compute a 4 or 6 parameter transformation between the pixel system and the fiducial system. Confirm that residuals are reasonable, then transform the measured CP's into the fiducial system.
- Refine these values by shifting to "principal point of best symmetry", and then applying radial lens distortion correction. For each point, determine the radial distance from PPS then linearly interpolate a radial correction based on the tabulated distortion values in the calibration report.
- Determine initial approximations to the 6 parameters of exterior orientation.
- Compute the resection solution. You may use resect.m (also need lsq_res.m, collin.m, cam.inp with new data, and resect.inp with your measurements). There are also some coordinate transformation tools also available. The folder of software that comes with the textbook is \ce503\cd. Of course you may also conjure up your own code to solve this problem. It is actually a very nice, nonlinear, indirect observation model, and you would learn a great deal by doing it yourself.
- Show the resulting parameters of exterior orientation and the observation residuals, are they reasonable?
- Include a few remarks about what you learned in this exercise.