CE 603 Photogrammetry II

Homework 3 Quickbird Condition Equation Evaluation

- Evaluate the condition equations for gcp #1 of the quickbird scene. i.e. show the misclosure in line and sample, steps outlined below
- Obtain the matlab version of the ephemeris data, “eph_att.mat”. When you load this you have dg1_eph (1536 x 13) and dg1_att (1536 x 15). Generate a time vector (1536 x 1) to go along with this (use start time & interval as documented in the dg1.eph and dg1.att files) suggest making time=0 in the middle.
- Measure point #1 in the image (l,s). Use the first line time and the line rate/interval in dg1.imd to obtain a time for that line/point. Use same time origin as above
- Interpolate 7 parameters for that time (X_L,Y_L,Z_L,q_i,q_j,q_k,q_s), make sure and normalize the q’s before using. Make interpolation by (a) linear method, and by (b) cubic spline method. Use MATLAB functions
    - PP=spline(t,par), obtain piecewise cubic spline coefficients for each of 7 EO parameter series, “par” at times “t”.
    - YY=ppval(tt,PP), use those spline parameters to interpolate at time tt.

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•Having interpolated for each of the 7 EO parameters, next normalize the quaternion (magnitude = 1). Evaluate the matrix M_b from this quaternion either by axis/angle conversion or direct evaluation.

•Evaluate M_c from the given satellite to camera quaternion (this one should be very close to the identity).

•If you choose to insert an $M_X(180)$ into the rotation sequence so z is up, then make sure you handle the principal point offsets correctly.

•Evaluate the 2 collinearity condition equations (we are looking for 2 digit misclosures!)

•When you have a result from above, evaluate numerically the sensitivity of the misclosure to each of the three exposure station components (6 numbers)

$$\frac{\delta F_x}{\delta X_L}, \frac{\delta F_y}{\delta X_L}, \text{etc.}$$