Photogrammetric Computer Vision
Exercise 05

Group 18(G_18):

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Part 1: Theory

1. **Why do we need the initial pose estimation? What happens, if we just run bundle adjustment?**

   Answer:

   Bundle adjustment is a non-linear method ,need the initial values to do the iteration, and the initial pose estimation provides good approximate values. If we don't do the initial pose estimation and just use a stochastic value to run the bundle adjustment ,it may not converge.

2. **How can more than three cameras be reconstructed? How can the reconstruction grow beyond what is visible in the first two cameras?**

   Answer:

   In order to reconstruct more than three cameras, the newly added image has common object points with former images, image points coordinates as measured values the objects space coordinates and exterior orientation elements as unknown values, add them in bundle adjustment to expand the Jacobian matrix.

   For part that is beyond visible in the first two cameras, discard the common points and don't add them in bundle adjustment, or set it to 0;

3. **What would have to be changed, to also estimate radial distortion in the bundle adjustment?**

   Answer:

   The radial distortion mainly affect the position of the image point(position from principle point). In order to estimate radial distortion, we need to introduce additional constant parameters(k1, k2) to calibrate the coordinate of image points, and calculate those parameters during bundle adjustment.