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# NAV STAGE 2

https://github.com/ehud-gordon/VAN_ex

## Question 2.3

- Describe how to define from $[R|t]$ a transformation $T$ that transforms from $left_0$ coordinates to $left_1$ coordinates.

Applying solvePNP we get $M = [R|t]$ a (3,4) matrix, the R&T matrix from L0 coordinates to L1 coordinates. So given a 3D point X, in L0 coordinates, we have that X in L1 coordinates $= Rx + t$.

- If camera $A$ has extrinsic matrix $[I|0]$, transformation $T_{A\to B}(x) = R_1x + t_1$ transforms from the coordinates of $A$ to the coordinates of camera $B$ and transformation $T_{B\to C}(x) = R_2x + t_2$ transforms from the coordinates of B to the coordinates of camera $C$, express transformation $T_{A\to C}$ and the extrinsic matrix of $C$ using $R_1, R_2, t_1, t_2$.

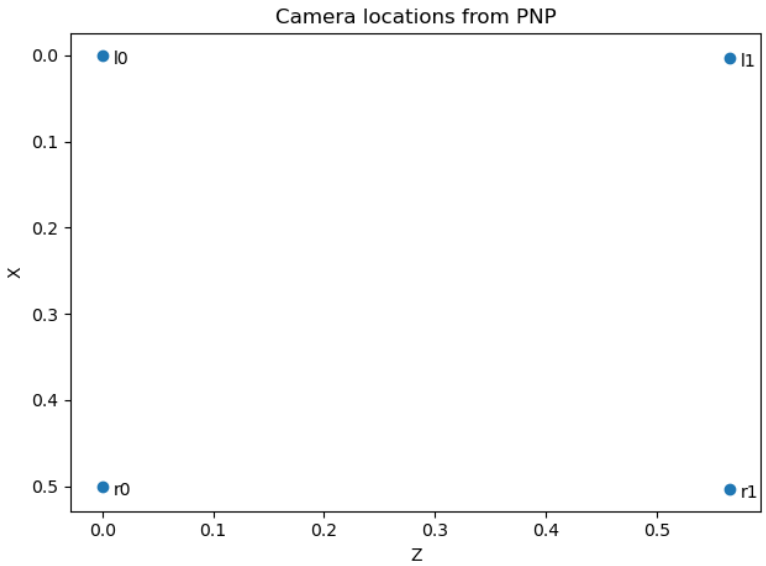
The transformation from A to C is simply applying $T_{A->B}$, and then $T_{B->C}$.

So $T_{A->C} = R_2(R_1x + t_1) + t_2$, and its extrinsimc matrix is $[R_2R_1|R_2t_1 + t_2]$

- For a camera with extrinsic matrix $[R|t]$, what is the location of the camera in the global coordinate system?

Let $d_w$ be the vector, in global CS, of the camera location. Then $t = -Rd_w$, meaning $d_w = R^T(-t)$.

- Plot the relative position of the four cameras (from above).

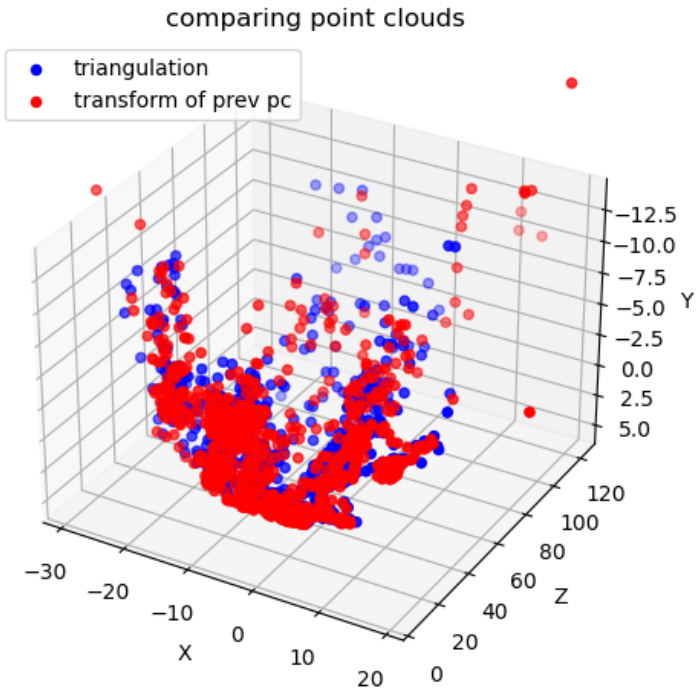


# Question 2.4

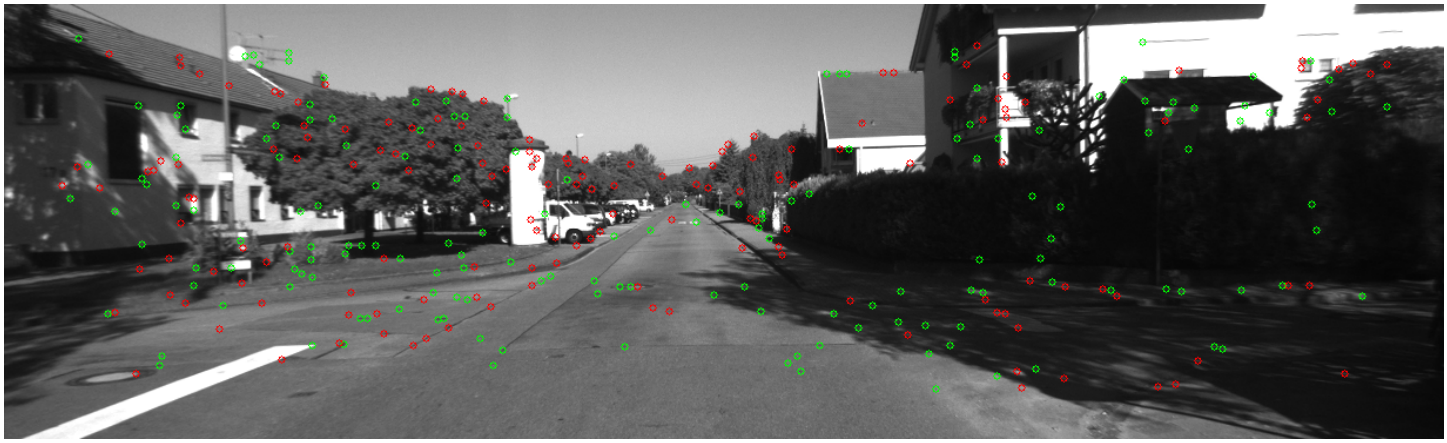
- Plot on images left0 and left1 the matches, with supporters in different color.

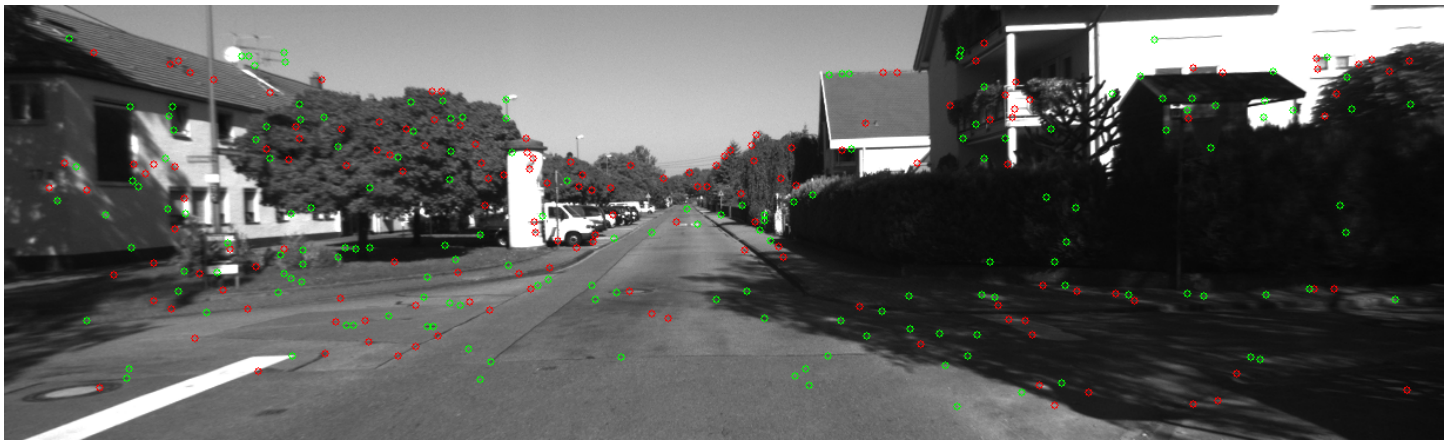
# Question 2.5

- Plot the two 3D point clouds from above. Use different colors for the two clouds.



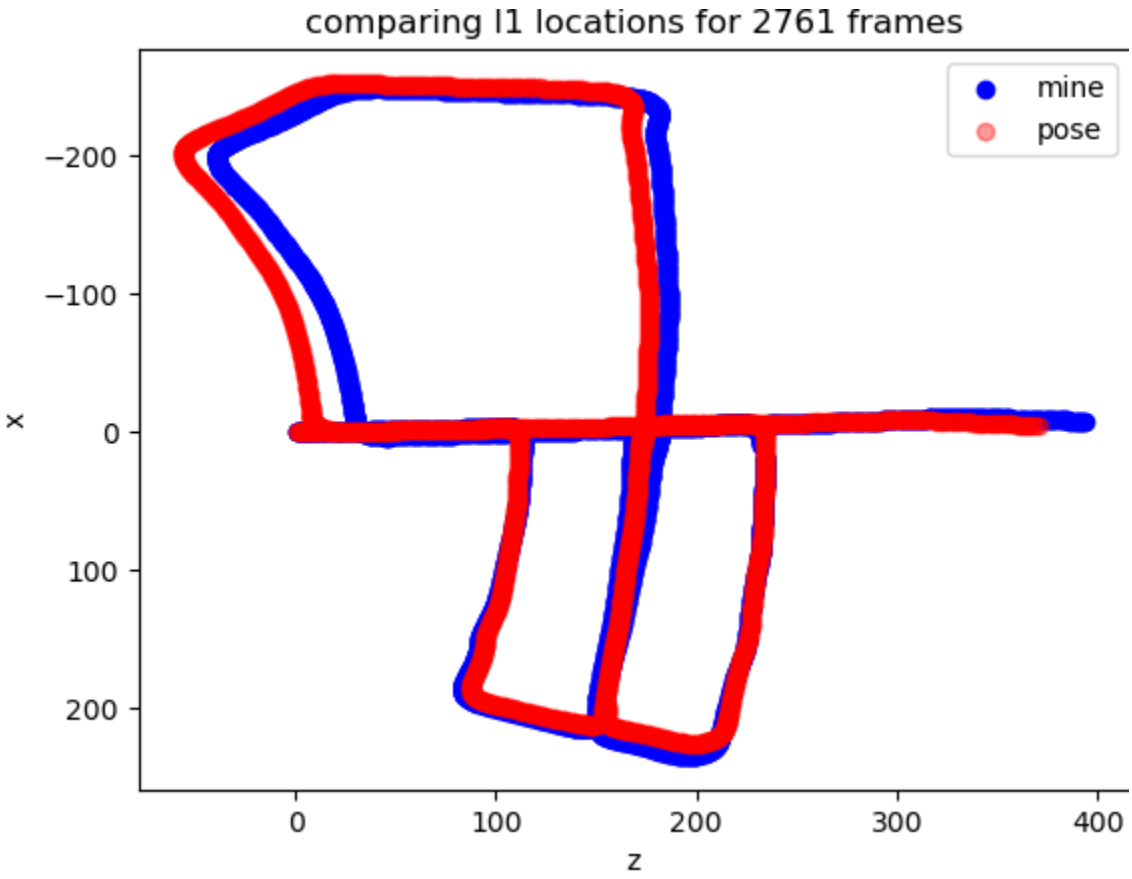

- Plot on images left0 and left1 the inliers and outliers in different colors.





# Question 2.7

- Plot a trajectory of all the left camera locations in the coordinates of camera 0, as viewed from above. plot the ground truth locations in a different color.




- How long did the tracking take?

The tracking for 2761 frames took 20 minutes.