CS543 Assignment 4

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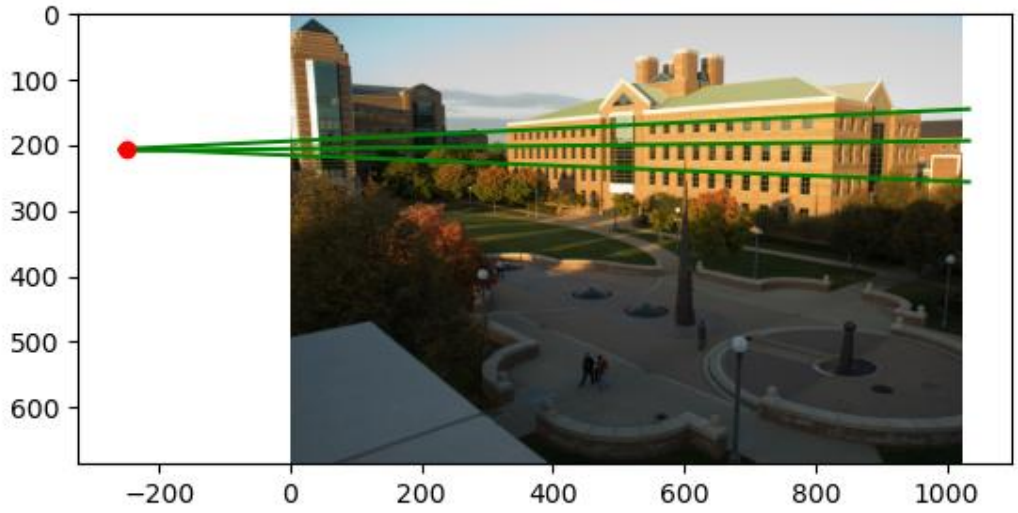
Your NetId: tc49

Part 1 Single-View Geometry:

Plot the VPs and the lines used to estimate them on the image plane using the provided code.

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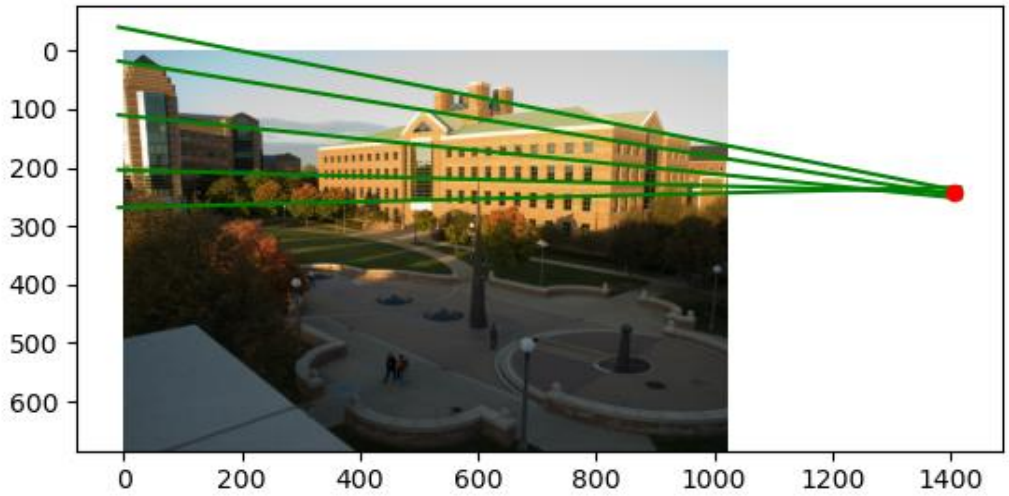
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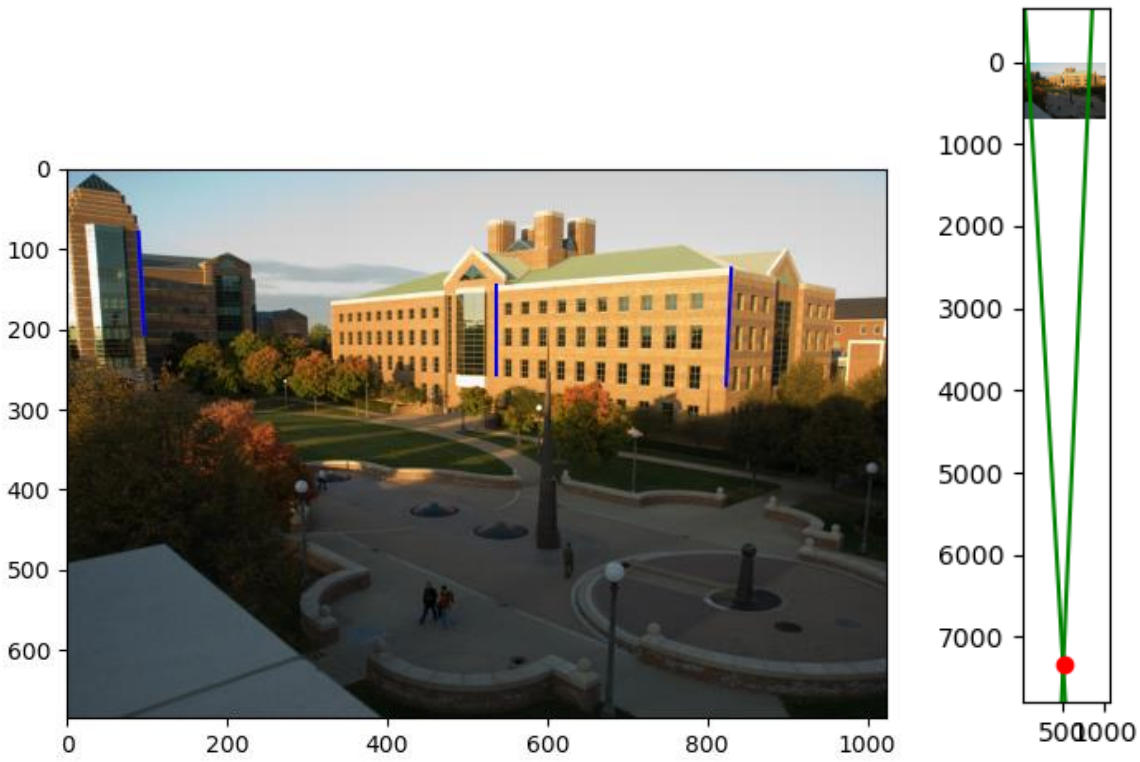


Specify the VP pixel coordinates.

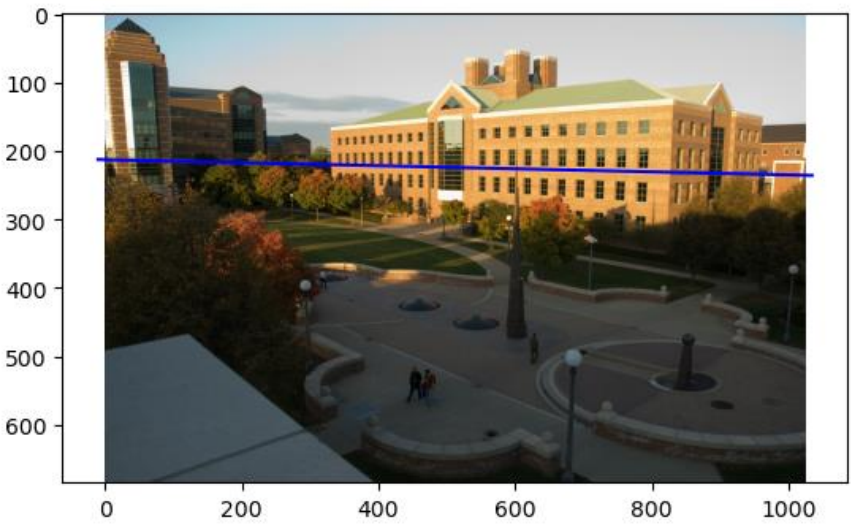
vp1 pixel: -249.64921085307577 206.96501400933536

vp2 pixel: 1407.3170323394002 243.95046472074443

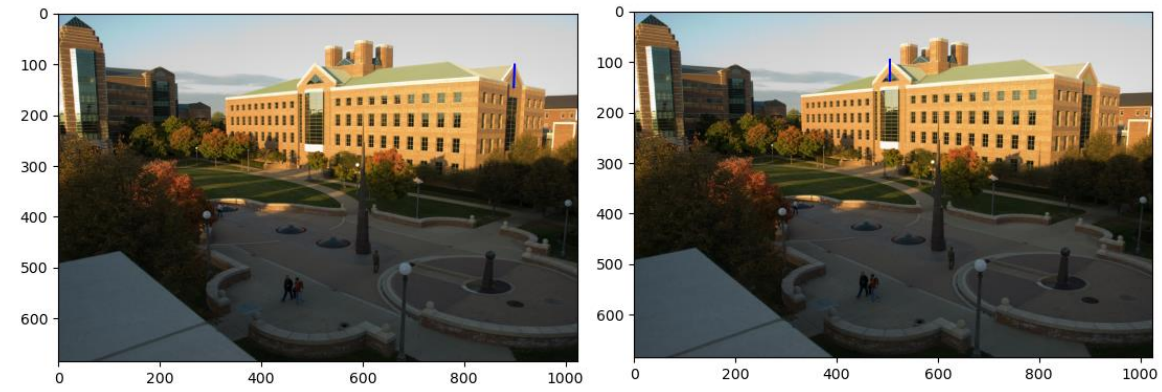
vp3 pixel: 522.0892947137346 7343.7185773853535

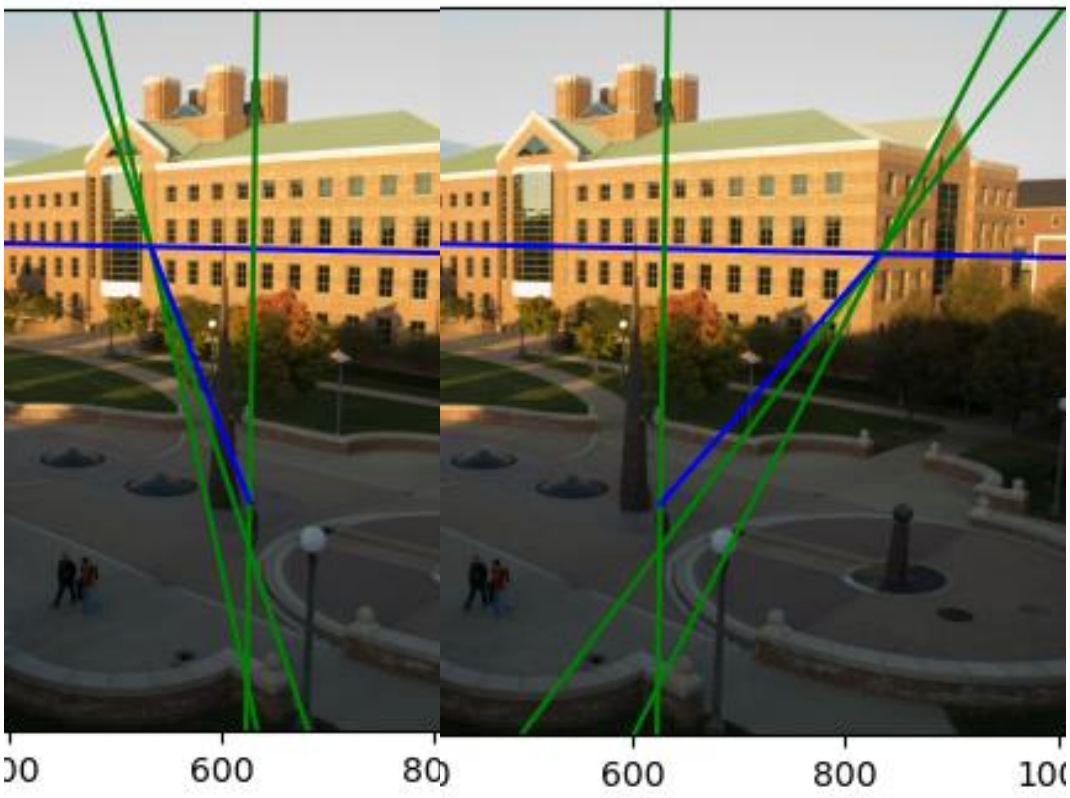
Plot the ground horizon line and specify its parameters in the form a * x + b * y + c = 0. Normalize the par ameters so that: a^2 + b^2 = 1.

Horizon line: [2.23156269e-02 -9.99750975e-01 2.12484553e+02]



Using the interface, construct the lines on the image that establish that the two gables on the CSL building a re the same height. Explain why these lines do so.





The pictures show that the two gables are the same height by intersecting the vertical reference line at the s ame position.

Part 2 Fundamental Matrix Estimation, Camera Calibratio n, Triangulation:

For the lab and library image pairs, display your result (points and epipolar lines) and report your residual f or both unnormalized and normalized fundamental matrix estimation.

Lab:

unnormalized:

Residual: 2.13043577968693

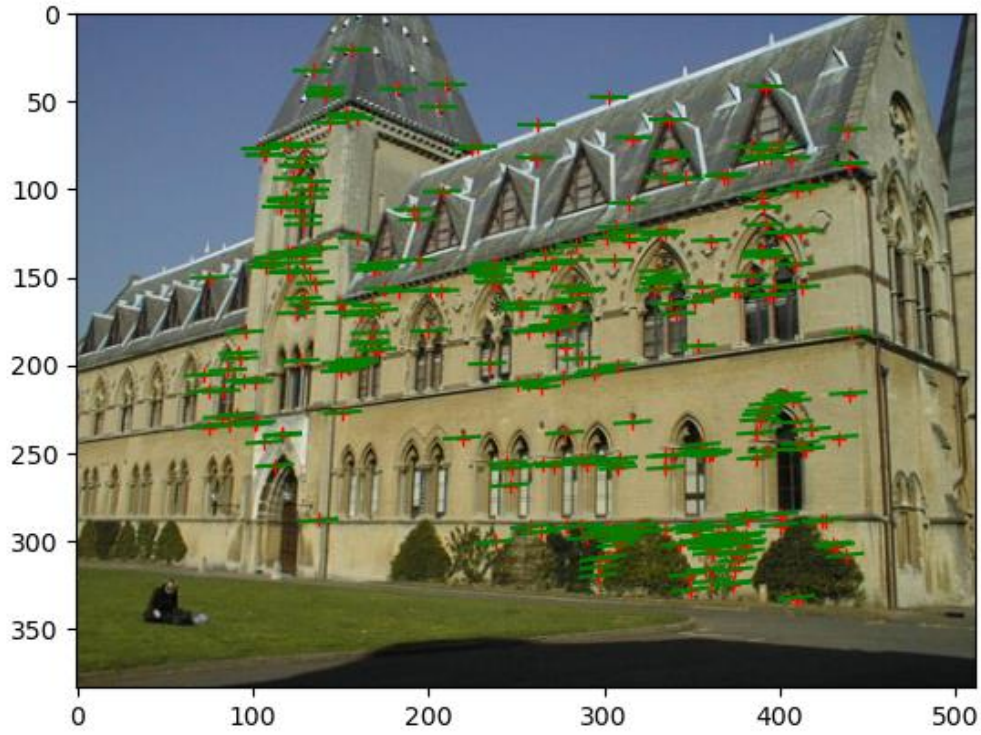
normalized:

Residual: -0.14916275804619036

Library:

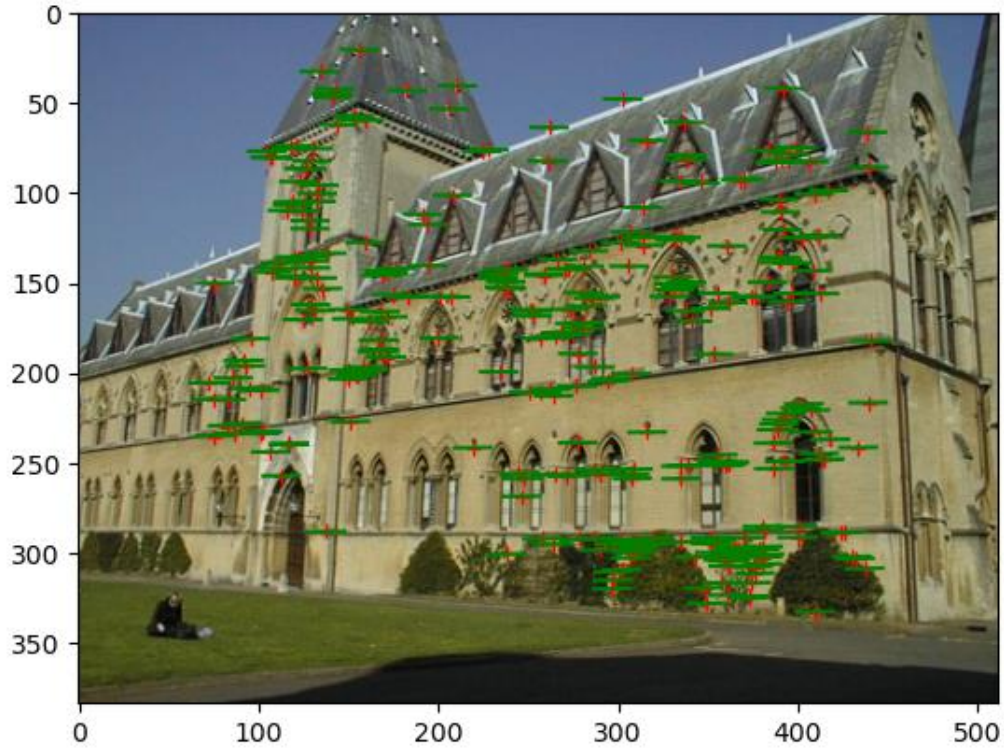
unnormalized:

Residual: 0.2947076598486313



normalized:

Residual: 0.04166594137474641



For the lab image pair, show your estimated 3x4 camera projection matrices. Report the residual between th e projected and observed 2D points.

Estimated camera projection matrices:

Camera Projection Matrix 1:

[[-3.09963996e-03 -1.46204548e-04 4.48497465e-04 9.78930678e-01]
 [-3.07018252e-04 -6.37193664e-04 2.77356178e-03 2.04144405e-01]
 [-1.67933533e-06 -2.74767684e-06 6.83964827e-07 1.32882928e-03]]

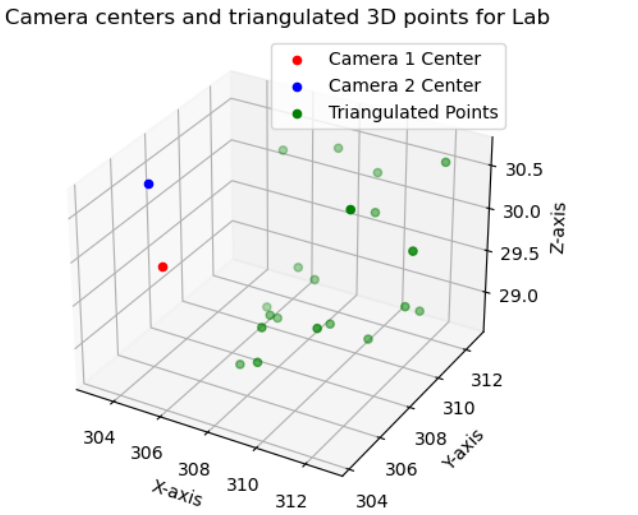
calibration residual: 13.545832903514446

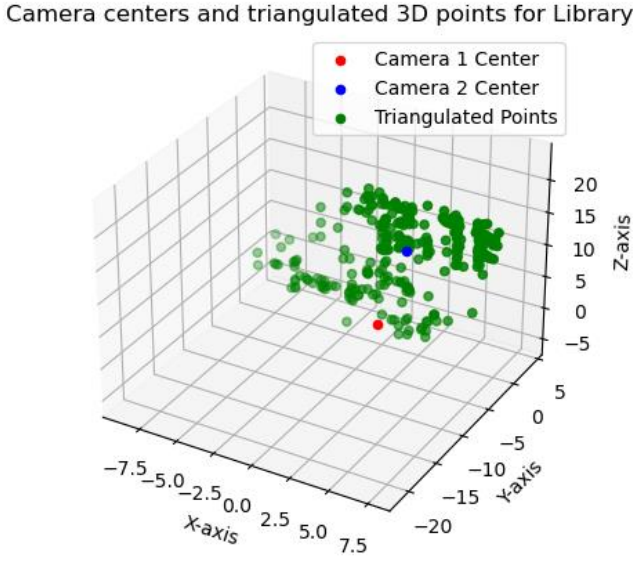
Camera Projection Matrix 2:

[[-6.93154686e-03 4.01684470e-03 1.32602928e-03 8.26700554e-01]
 [-1.54768732e-03 -1.02452760e-03 7.27440714e-03 5.62523256e-01]
 [-7.60946050e-06 -3.70953989e-06 1.90203244e-06 3.38807712e-03]]

calibration residual: 15.54495345362814

For the lab and library image pairs, visualize 3D camera centers and triangulated 3D points.



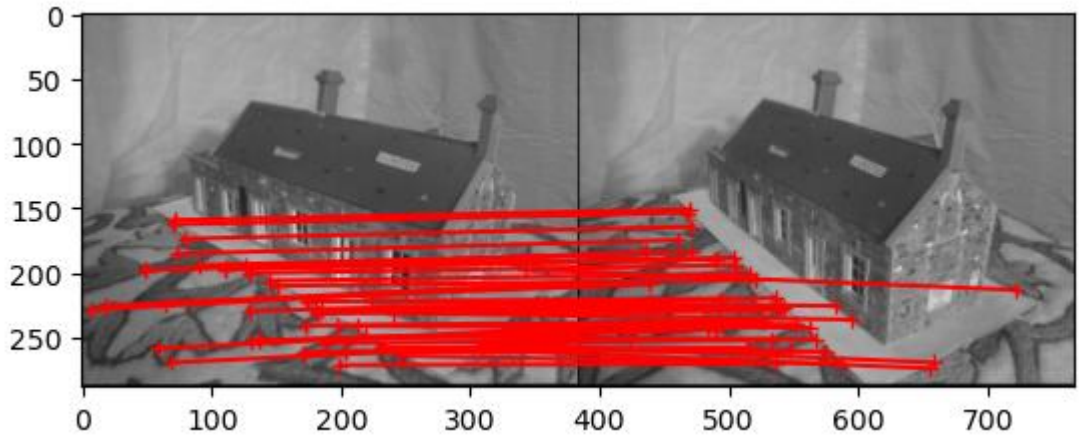


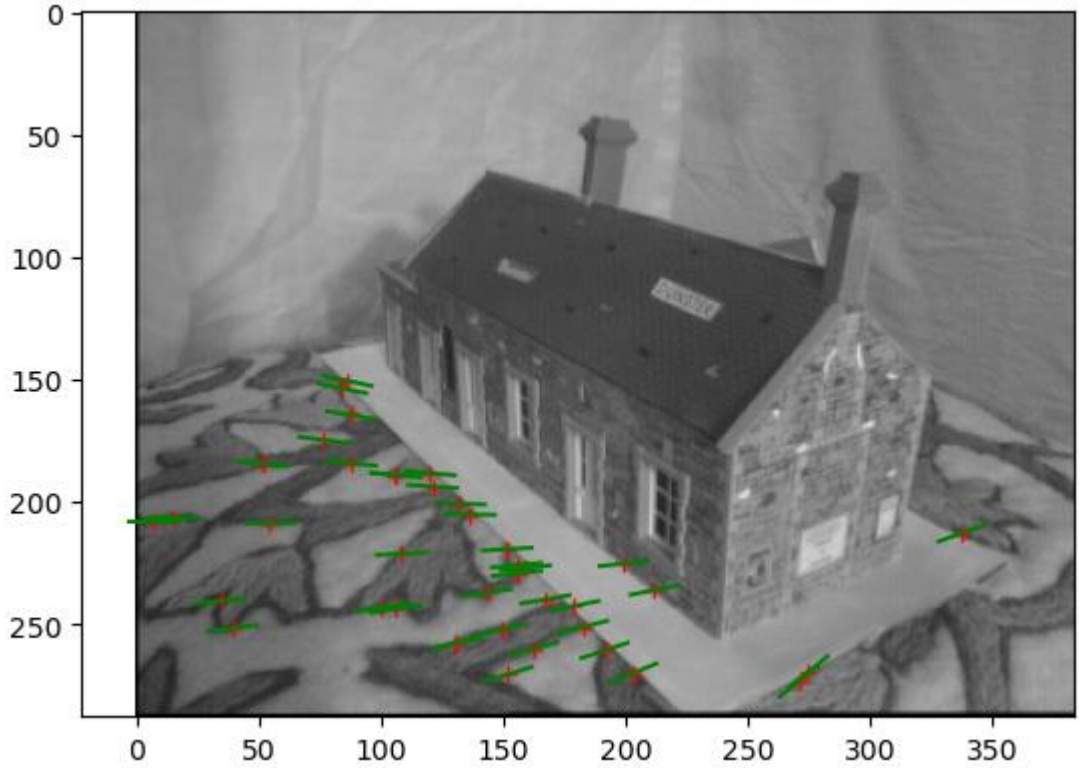
For the house and gaudi image pairs, display your result and report your number of inliers and average inlie r residual for normalized estimation without ground truth matches.

house:

Number of inliers: 42

Average inlier residual: 0.6093184174530849

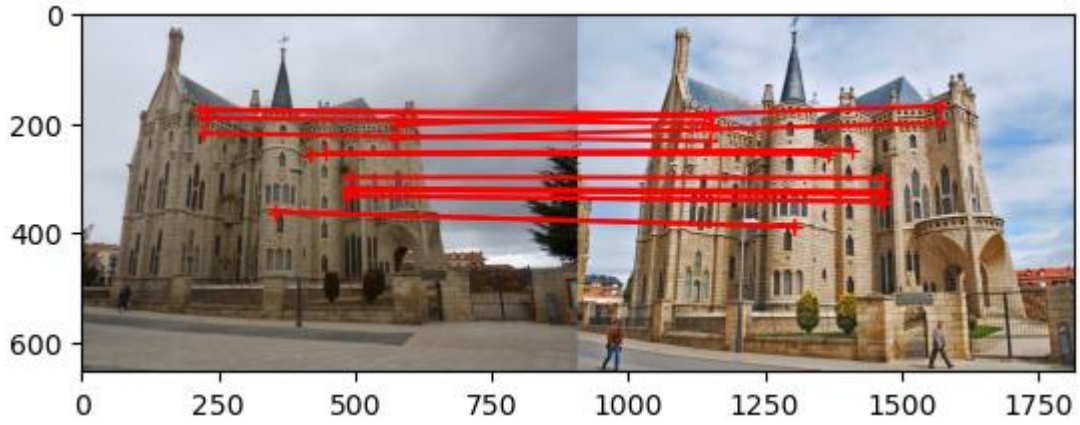


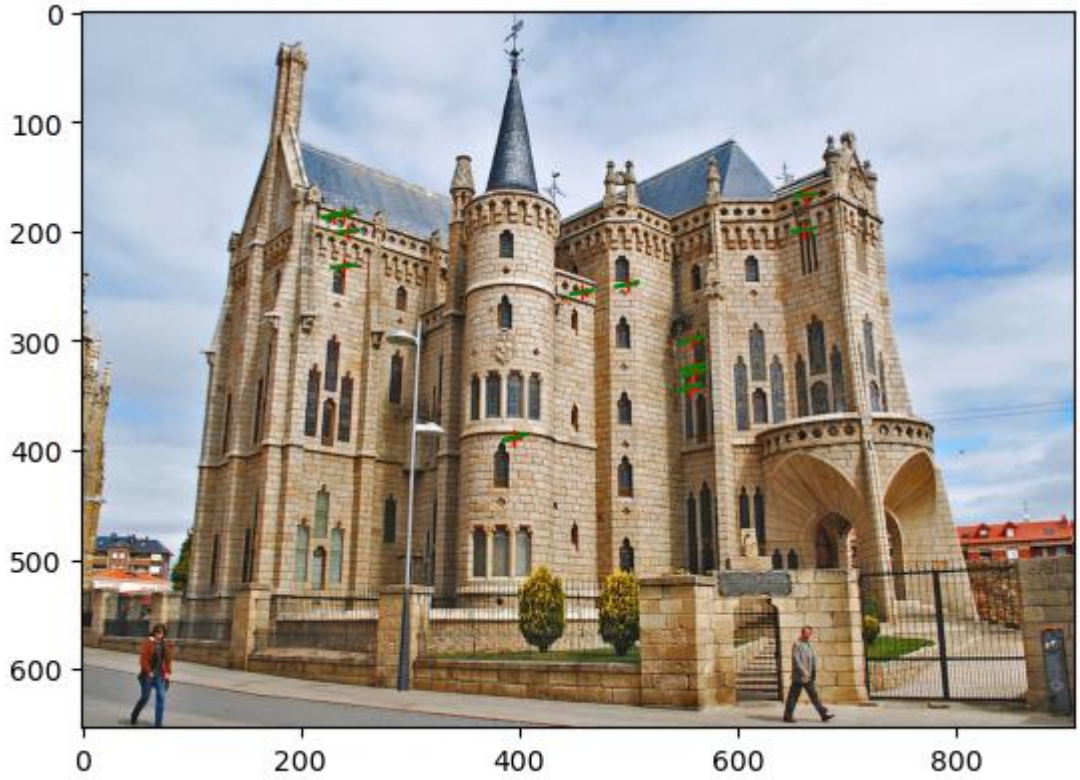


gaudi:

Number of inliers: 15

Average inlier residual: 0.5291329656908924





Extra Credit:

Don’ t forget to include references, an explanation, and outputs to receive credit.