**Homework 4 - Structure From Motion**

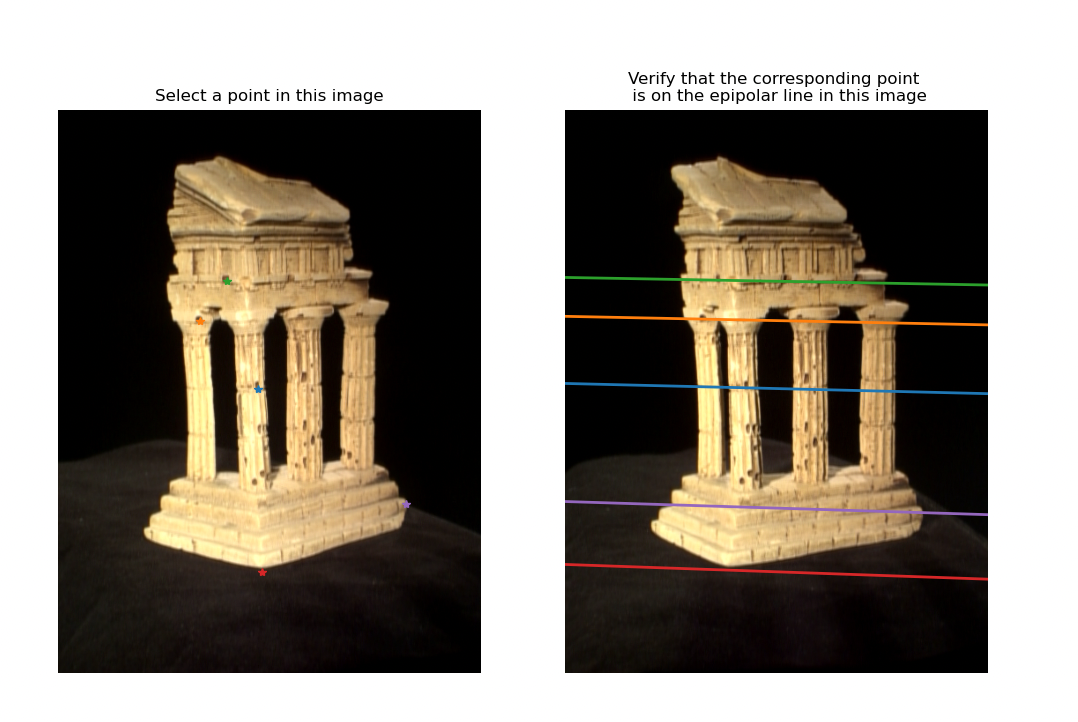
**Ron Benchetrit – 312167554**

**Doron Hanuka –**

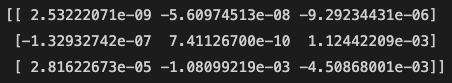
**Part 1 - Sparse Reconstruction**

* 1. **Eight Point Algorithm:**

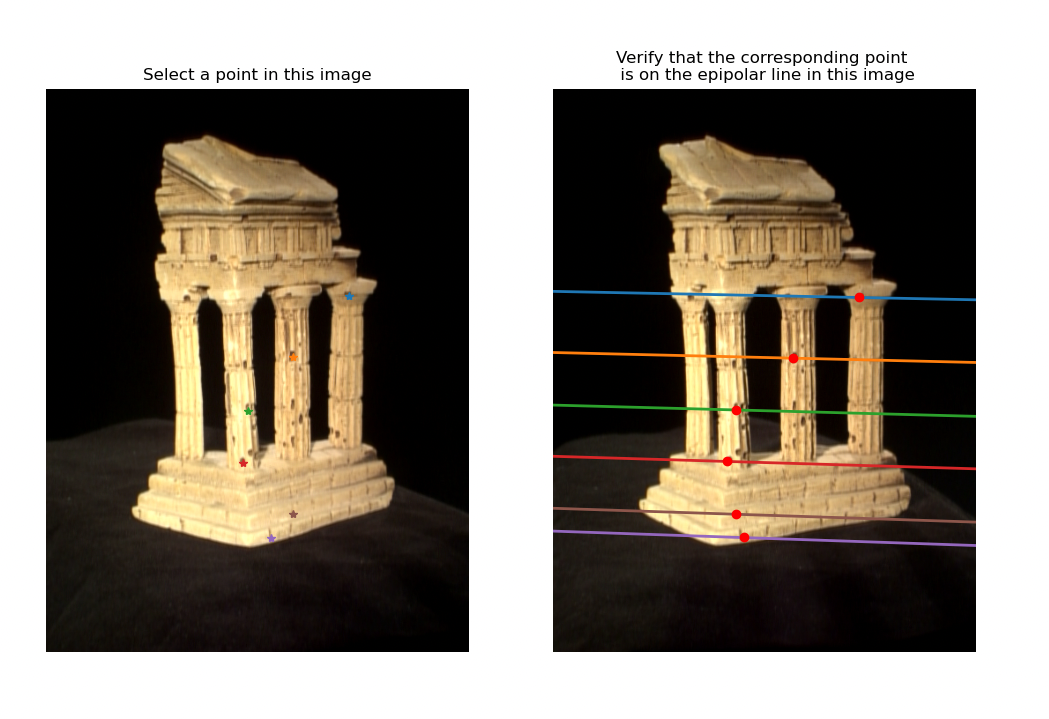
Visualization of some epipolar lines:

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Resulted fundamental matrix:



* 1. **Epipolar correspondences:**

Except the brown point, all correspondences are correct.

We generated 50 candidates along the epipolar line.

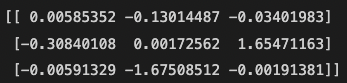
We decided to use a window of size 21 (10 in each direction around the candidate pixel) and compare the windows using the L1 norm.

Because we just use the L1 norm the matching is sensitive to orientation, scales and noise.

It would be better to use a descriptor such as SIFT or ORB but for case the L1 norm suffices and works well most of the time.

* 1. **Essential Matrix:**

Resulted E:



* 1. **Triangulation:**

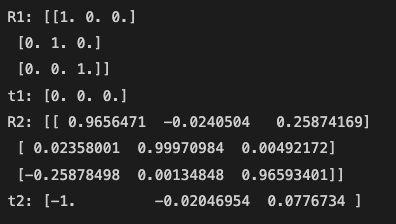
We found the right extristics matix by going over all the candidates, triangulating the points, and see for which extrinstics the depth is positive both in camera 1 frame and in camera 2 frame.

We got the following re-projection errors in pixels units.



* 1. **Putting It All Together:**

Transformations parametrs:



Final reconstruction:

