Homework 4 - SfM

1. In this homework, you have to work on not only the given data but your own photos.

2. You are allowed to use any camera calibration related functions.

3. Deadline: **2021/05/24 23:55**

Homework 4 - SfM

Just to let you get initial experience on SfM

two images
know intrinsic matrix

$$K = \begin{matrix} 1.4219 & 0.0005 & 0.5092 \\ 0 & 1.4219 & 0.3802 \\ 0 & 0 & 0.0010 \end{matrix}$$

Steps

1. find out correspondence across images
2. estimate the fundamental matrix across images (normalized 8 points)
3. draw the interest points on you found in step.1 in one image and the corresponding epipolar lines in another

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4. get 4 possible solutions of essential matrix from fundamental matrix, hint:

```
[U,S,V] = svd(E);
m = (S(1,1)+S(2,2))/2;
E = U*[m,0,0;0,m,0;0,0,0]*V';
[U,S,V] = svd(E);
W = [0,-1,0;1,0,0;0,0,1];
```

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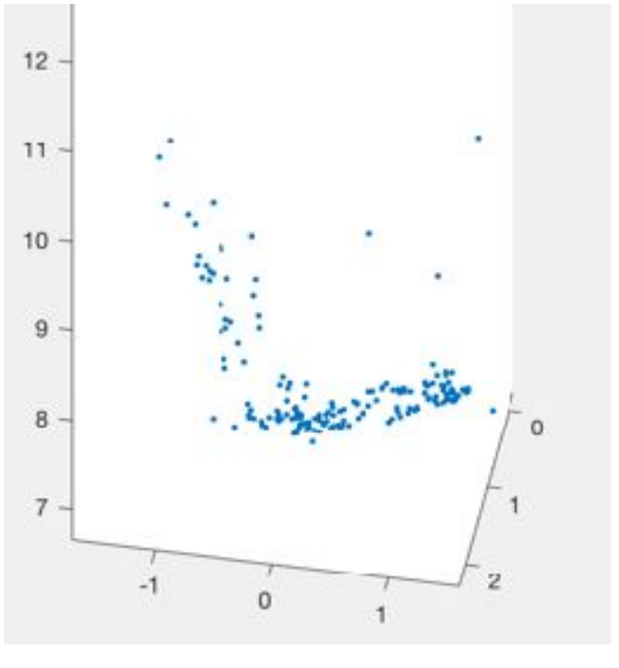
5. find out the most appropriate solution of essential matrix
6. apply triangulation to get 3D points



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6.apply triangulation to get 3D points
7.use texture mapping to get a 3D model (matlab code will be provided)
obj_main(3dPoints, 2dPoints, CameraMatrix, 'Mesona1.JPG', 1);

$$K[I \mid 0]$$

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two images
know intrinsic matrix
know extrinsic matrix

(extrinsic for your reference)

$$P = K [R, -RT]$$

Homework 4 - SfM

- For your own photos:
  - Take your own photos
  - Do calibration on your photos
  - Reconstruct 3D model
- For the given data:
  - Follow instructions in slide 2 to 6 to reconstruct 3D model.
  - Camera parameters are provided in *Statue_calib.txt*