

EEN020 Project

Pranav Saibhushan Ravuri (in collaboration with Sara Strähle)

January 24, 2024

Algorithm

- Initialization
 1. Prepare the data by finding SIFT points and their descriptors
 2. Set initial parameters
- Step 1 and 2: Finding relative rotations (and translations) and upgrading to absolute rotations and translations.
 1. Loop through consecutive images to estimate E robustly using Parallel RANSAC
 2. Now we estimated P matrix using E using chirality.
- Step 3: Find 3D-points using the initial pair of images.
 1. Now we find image points from the initial image pair, save the 3D descriptors desc_X
 2. eliminate the outliers and estimate the 3D points using the two images.
- Step 4: Find T robust
 1. So, now we have X, x and R, and find Translation robust.
 2. Using the translations we constructed the P as $[R \mid T]$ matrix for all the cameras and Plot them.
- Step 5: Find 3D-points using the rest of the pair of images.
 1. Loop through consecutive images and triangulate using x1, x2 and P.
 2. Filter 3D points which are too far from the center

Common Problems

- The 3D reconstruction using the initial pair is always giving better results
- Finding order of multiplication of rotation matrices
- The robust estimation of T is something that is different from the computer exercises done before (Now fixed)
- Dataset 7 seems to fail partially

Dataset 3

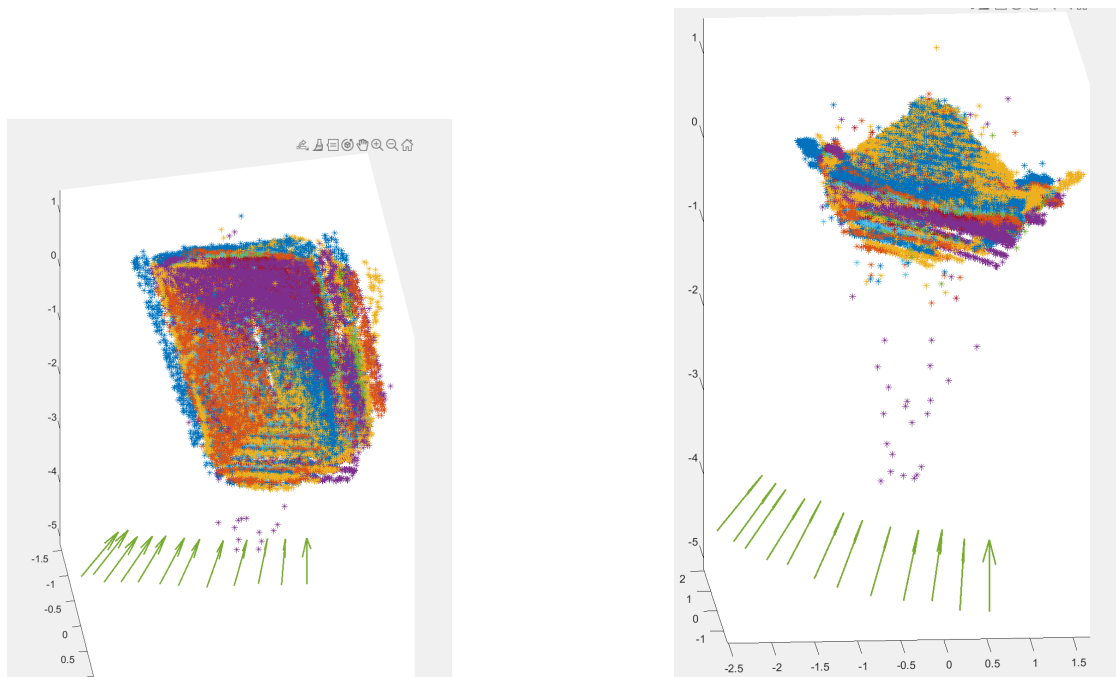


Figure 1: Dataset 3

The stairs and the arches can be seen neatly in the 3D estimation

Dataset 4

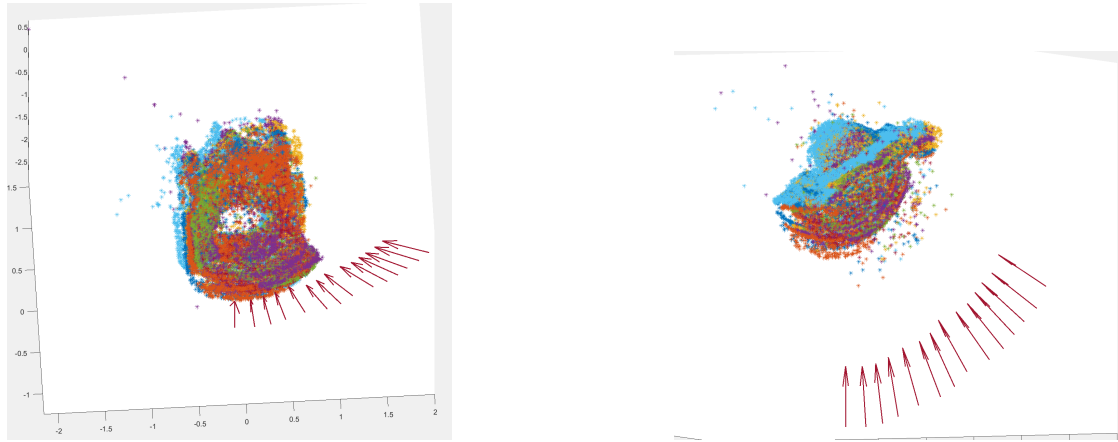


Figure 2: Dataset 4

The 3D reconstruction seems to pickup the indent in the fountain really well

Dataset 5

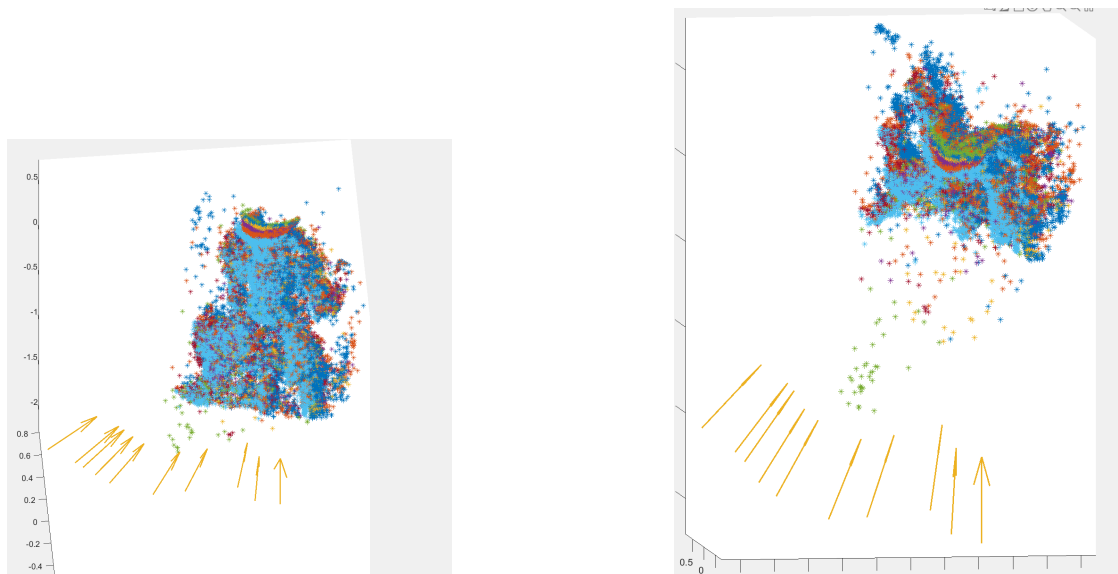


Figure 3: Dataset 5

The idol can seen clearly, the arms, the legs and the head

Dataset 6

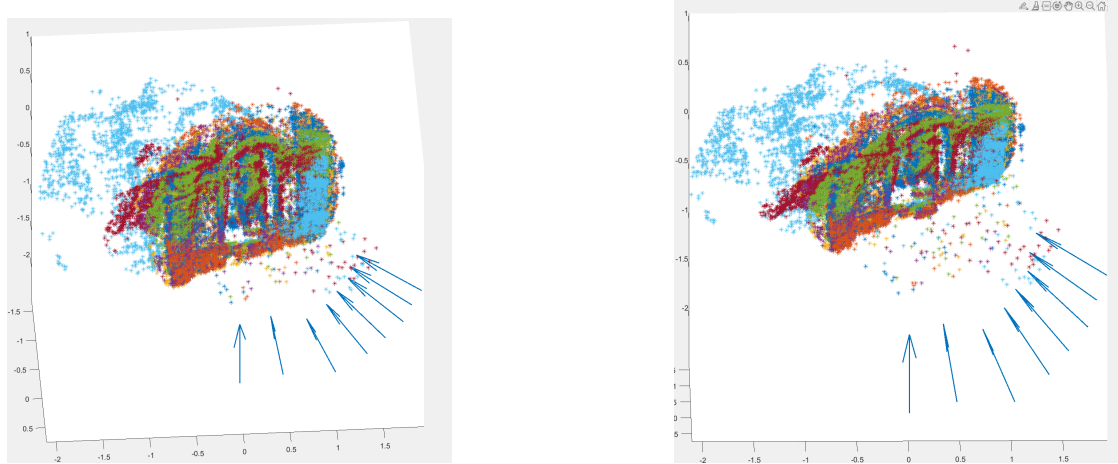


Figure 4: Dataset 6

The flat wall is picked up really well, although the idol is not that clearly visible.

Dataset 7

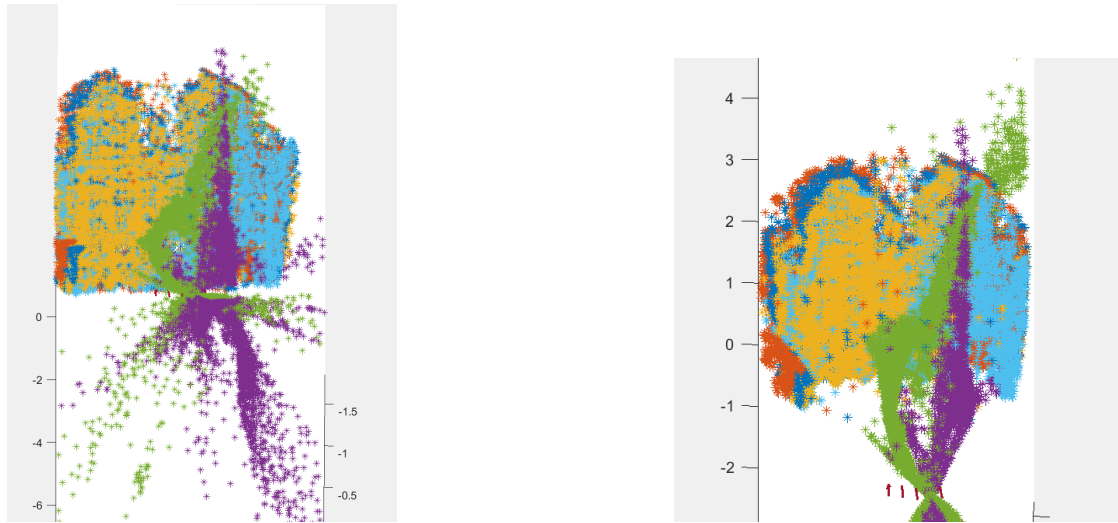


Figure 5: Dataset 7

This dataset seems to give a lot of trouble even after debugging, but zoomed in the building can be seen vaguely

Dataset 8

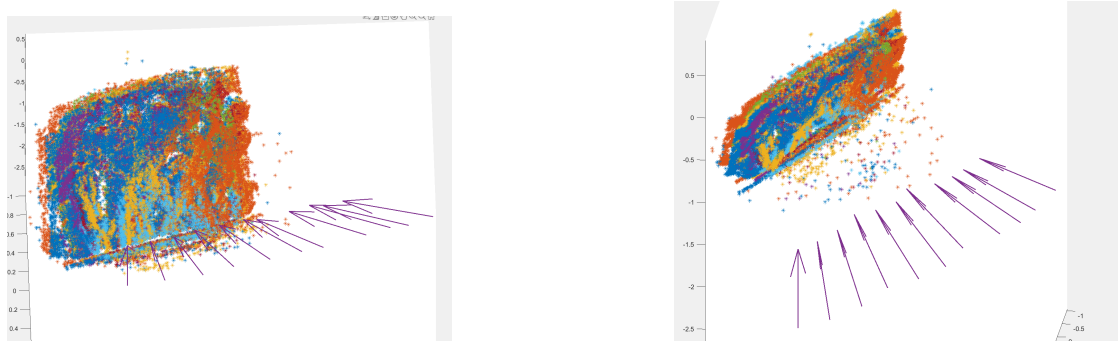


Figure 6: Dataset 8

The wall is reconstructed really well, the idols are slightly visible

Dataset 9

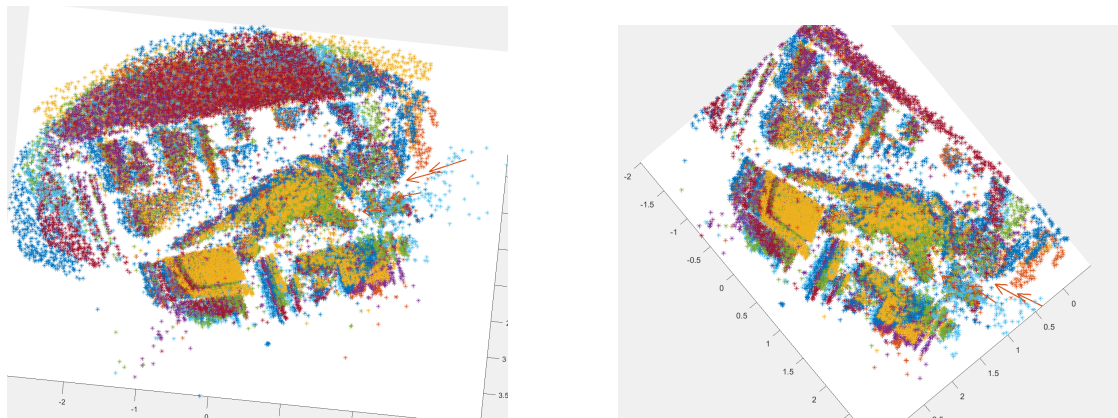


Figure 7: Dataset 9

The table is and the dinosaur are visible clearly