ISTA 421 / INFO 521 - Final Assignment - Project Option A

Due: Monday, December 12, 5pm

The total points here comprise 10% out of the 15% of the Final Assignment

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Tasks

1. **Solution.**
   The implementation is in the script `projectA_MH_sampling.py` under the root of the project folder. The funciton `MH_sampling` implements the Metroplis-Hastings algorithm.

2. **Solution.**
   The plots for the parameters of the MAP estimate of the 3D line segment is shown in Figure 1. There are total 1000 iterations. We can see that for all six parameters, in the beginning sampling phase, the samples move up or down until after about 200 iterations, they converge and only oscillating with small amplitude around particular region of parameters' space.

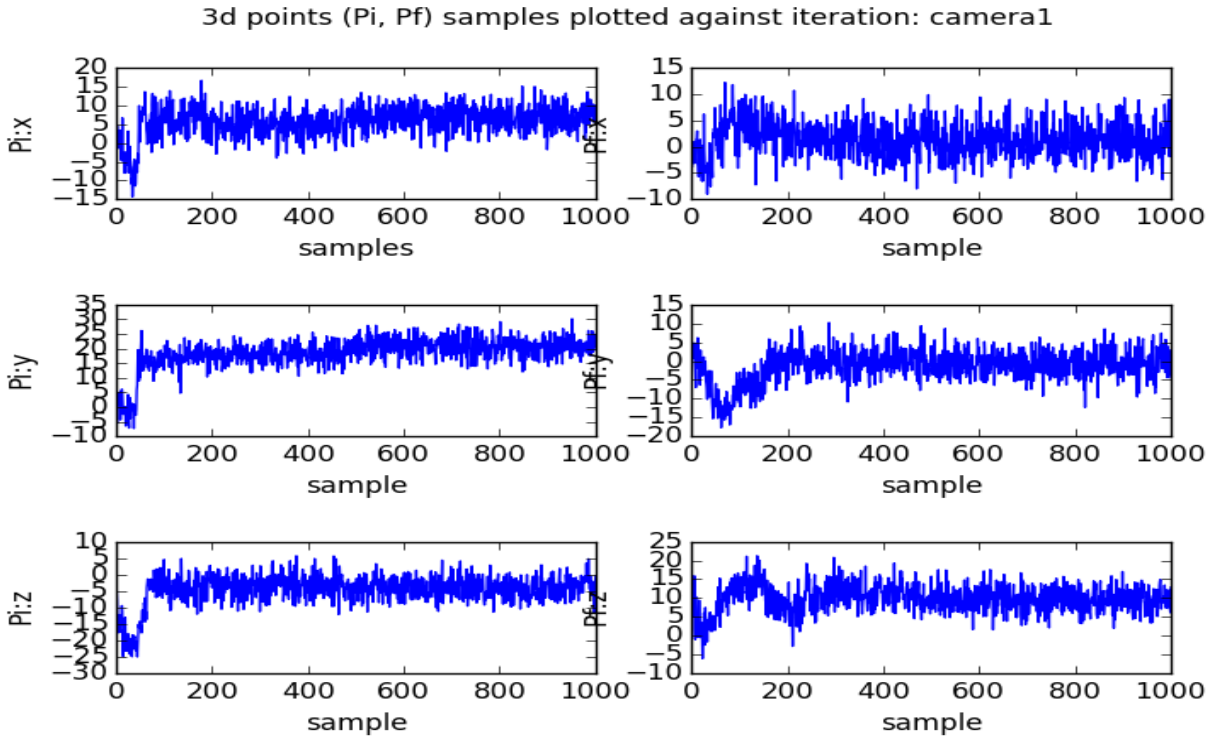

Figure 1: Parameters of the MAP estimate of the 3D line segment plotted against iteration

3. **Solution.**
   Monte Carlo estimate of the mean of the posterior distribution is shown in the below output of the script:

```
Monte Carlo estimate of the mean of posterior distribution
E(pi): [  4.43713774  11.25241618  -2.10647174], E(pf): [ 2.27078722 -1.24448139  9.62768856]
```

4. **Solution.**

Monte Carlo estimate of the predicted (2D) output point at -0.5 is shown in the below output of the script:

```
Monte Carlo estimate of the predicted (2D) output point at -0.5: [-3.1436406 -8.5602705]
```

5. **Solution.**
The plots for the parameters of the MAP estimate of the 3D line segment for camera 2 is shown in Figure 2. There are total 1000 iterations. The results are different with that of the camera 1, because different camera matrix will map the 3D points from the same distribution into different 2D points, thus lead to different results.

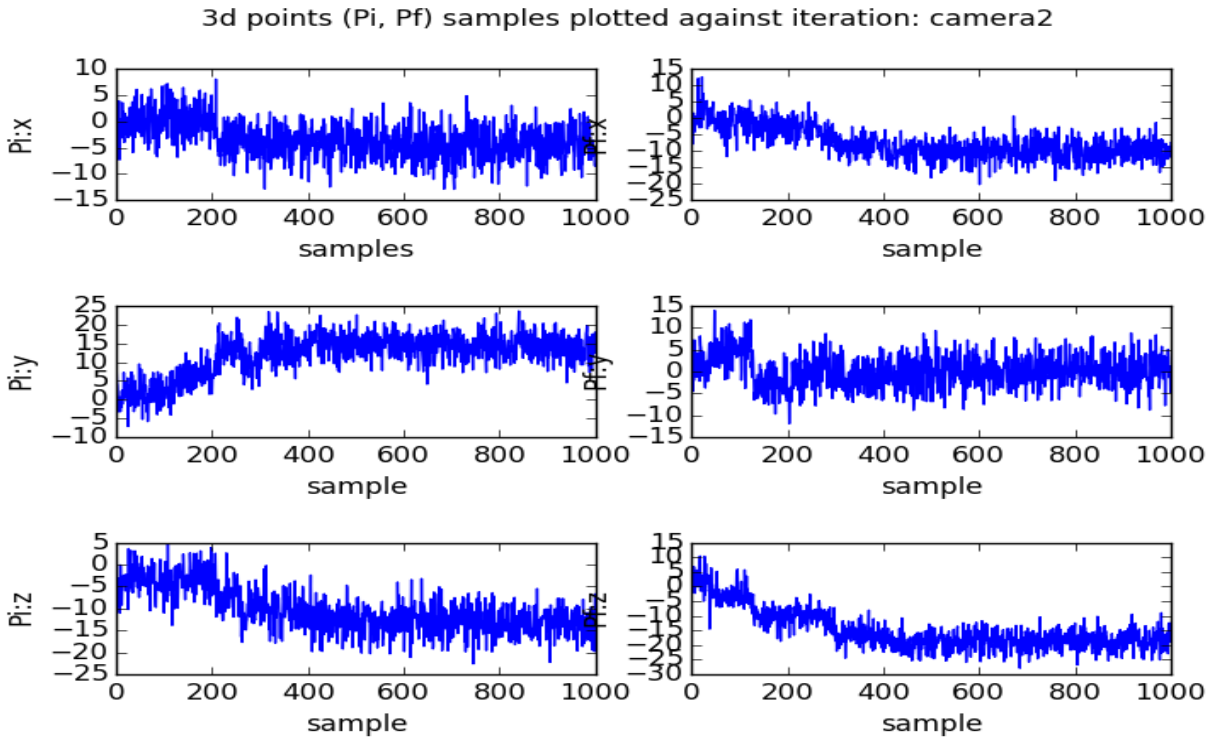

Figure 2: Parameters of the MAP estimate of the 3D line segment plotted against iteration - Camera 2