The BRG Visual-Inertial Odometry Documentation

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Abstract

The purpose of this article is to document the approach to the Bretl Research Group's visual-inertial odometry method. To develop this method we test using a segment of the Euroc dataset.

1 Introduction

1.1 Coordinate Systems

1.2 Peformance Evaluation

We evaluate performance using measure of the relative pose error (RPE) of the translational state estimate over 100 time intervals. Each interval will have at least 20 measurments of RPE. We then plot RPE as a function of the time interval at 25%, 50%, and 75% quartiles. This RPE is computed as defined by [1]. Given a time interval Δ, ground truth pose $Q \in SE(3)$, and estimated pose $P \in SE(3)$, at time step i the RPE is computed as

$$E_i = \left(Q_i^{-1} Q_{i+\Delta}\right)^{-1} \left(P_i^{-1} P_{i+\Delta}\right). \tag{1}$$

This code is currently in the `perf_eval` folder and is written in Matlab. When running the `rpe_main.m` script, one simply has to type the name of the ground truth and estimated pose files. The files must be moved into the `perf_eval` directory. Figure 1 show an example of the output of the performance evaluation script.

2 Conclusion

blah blah blah

References

[1] J. Sturm, N. Engelhard, F. Endres, W. Burgard, and D. Cremers, "A Benchmark for the Evaluation of RGB-D SLAM Systems," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Vilamoura, Algarve, Portugal, October 2012, pp. 573–580.

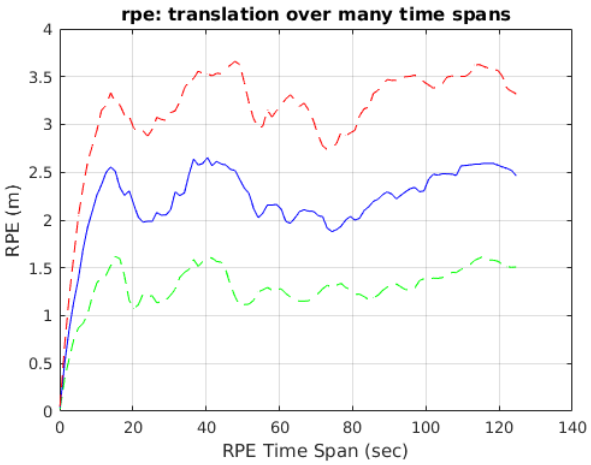

Figure 1: We evaluate our result by computing translational RPE (i.e. $\|trans(E_i)\|$) for a set of time spans (Δ). The dashed red line shows the 75 percent quartile, the solid blue line is the median, and the dashed blue line is the 25 percent quartile.