

Project 3 Phase 2 Report

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Remainder

1. I use `backward.cpp` to debug, which requires `-ldw` in my `aug_EKF CMakeLists.txt` (To be honest, I have not idea about what is `-ldw`) If you fail to build the project in your workspace, I can show demo to you in person.
2. The linearization part of G2 is based on the work of Zhengyu Fu. Actually we implemented that with same method (Matlab Symbolic), but I make some problem when converting Matlab code to C++ code.

Figures

Figure 1: Augmented EKF with simple bag

- Red line: path
- Arrow: Augmented EKF odometry result

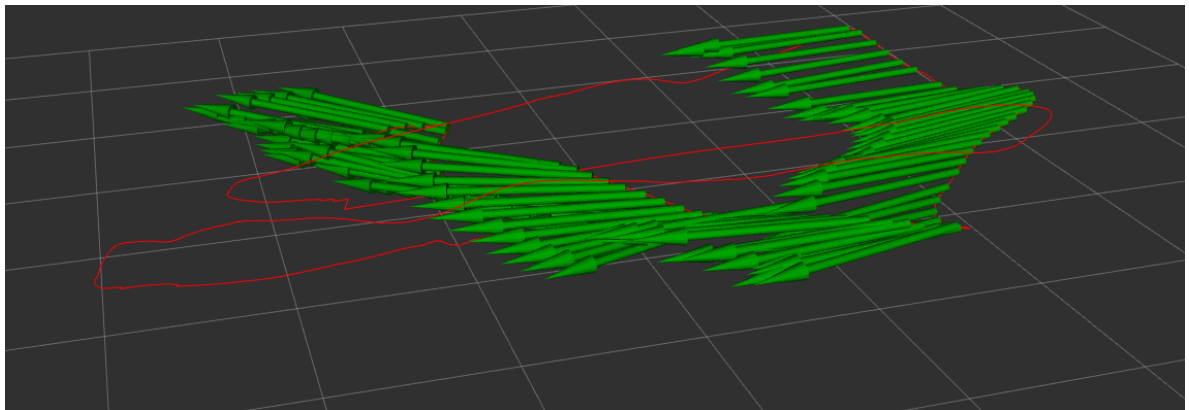


Figure 2: Augmented EKF with original bag

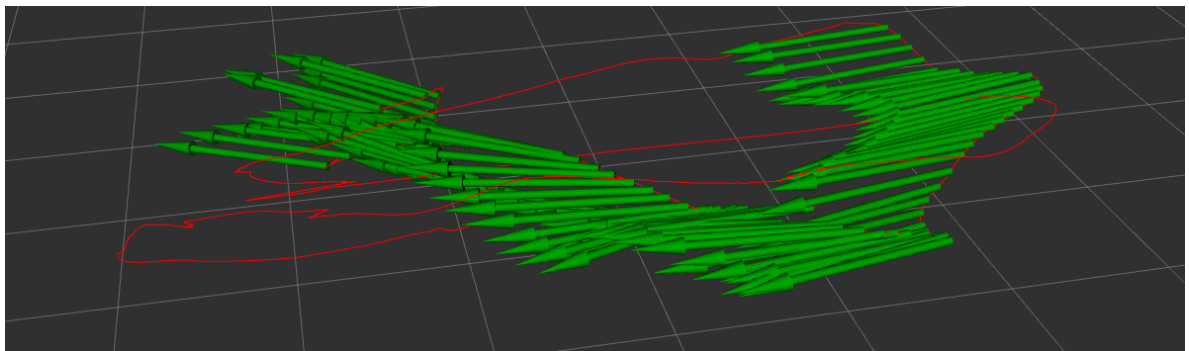
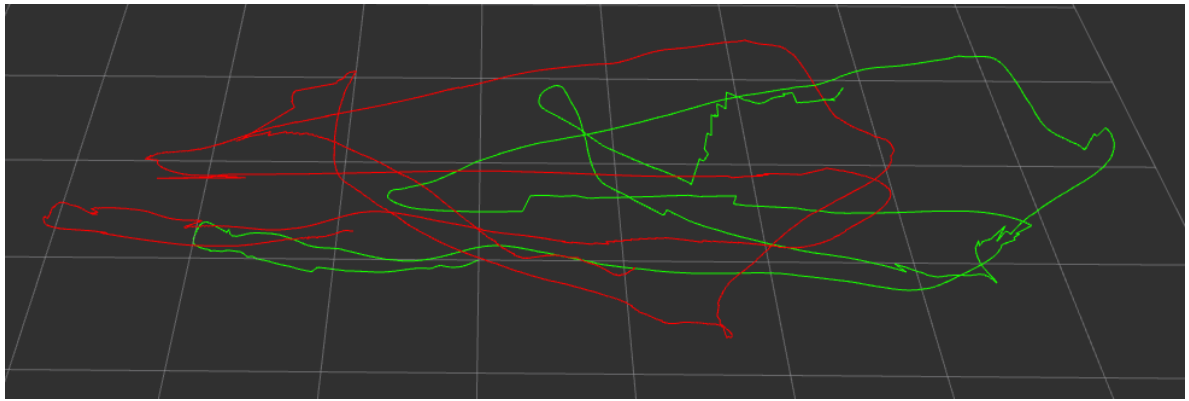


Figure 3: Comparison of VO and Augmented EKF with original bag



Implementation

Initialization

I use the first PnP frame to initialize the filter, and treat it as the first keyframe. Follow with augmented EKF.

Augmented EKF work flow

Start with PnP_0:

1. If next frame is IMU:
 1. add to the end
 2. IMU prediction
2. if next frame is PnP:
 1. insert it to deque
 2. measurement update
 3. repropagate
3. if next frame is VO:
 1. if Keyframe changed:
 1. insert it to deque
 2. find the keyframe in deque
 3. repropagate
 2. If keyframe not changed
 1. insert it to deque
 2. measurement update
 3. repropagate