VIO paper list

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Abstract

Prof. Stergios 在 2019 IROS VIO Workshop 上做了一个非常不错的 VIO 报告，这个文档将他 PPT 中推荐的论文进行了归类整理，值得学习。虽然大部分工作都是他们自己实验室的，不过依此检索就能找到更多资料。另外，需要注意的是下面推荐的资料只是 PPT 中的部分论文，一些简单的被我省略了，并且我手头没有 PPT 原件。

1 资料推荐

这部分是常规的一些 VIO 资料推荐，绝大部分都是明尼苏达大学的论文。

1.1 VIO 基础

首先是黄老师 2019 的 VIO 综述[1], 分类详细，推荐全面，十分干货。另外，关于 IMU 的一些简单知识，Stergios 推荐阅读 MSCKF[2] 论文.

1.2 Camera-IMU Calibration

这里主要是推荐了两篇论文：关于Camera IMU 外参数可观性分析的[3] 以及关于时间戳延时标定的[4].

1.3 Feature Tracking Outlier Rejection

如果不考虑陀螺仪 gyro 的旋转值，那常规的 Outlier Rejection 一般是基于 5 点法本征矩阵的 RANSAC 算法。如果考虑 gyro 的值，则可以采用 2pt RANSAC [5].

1.4 Filtering vs. Optimization-based Methods

这里主要是基于优化的滑动窗口算法 sliding window[6] 以及 Kejian Wu 的 均方根信息滤波器 SR-IF[7]. Kejian Wu 在信息滤波上做了很多不错的工作，可以 follow 下他的论文。

1.5 Inconsistency of VIO

关于可观性一致性分析的两篇论文[8, 9].

1.6 Mapping Backend

离线的 VIO 多机建图 [10]，而在线的 VIO 建图当然首推 ETH 的 maplab [11] 框架。一种考虑重力方向的多子图对其算法[12], 当然还有 VINS-Mono[13].

1.7 Map-based Updates

这部分可以认为是基于地图点的 VIO[14], 也可以认为是在线的 VIO 怎么利用历史信息[15]。

1.8 Cooperative VIO/SLAM

这里比较有意思的 IROS 2019 上 Google 的这篇论文[16]. 两台手机各自有一个服务端和客户端，可以相互访问对方手机上的视觉地图，在一个环境中进行地图共享 AR 游戏。一些其他的工作 [17, 18].

2 Interesting Research Directions

这部分是 Prof. Stergios 觉得有意思的研究方向。

2.1 Observability Analysis

以前的论文较少分析特定运动条件下的可观性，近两年出现了部分工作，如 vins on wheel [19] 就是一个非常不错的论文。当然还有各种特征（点，线，面）在特定条件下对 VIO 系统可观性的影响[20, 21]. 当然还有特定条件下 IMU/Camera intrinsics, extrinsics 参数的可观性，这部分作者没有推荐论文，我也见得比较少。

2.2 Event-based Camera

这个方向 VIO 的工作还比较少，个人感觉主要是 event camera 中特征的提取和跟踪好像还不是很好。不过 2018 年有一篇考虑连续时间的 event camera vio [22] 感觉很不错。当然还有 2019 年的结合普通 camera 和 event camera 的 VIO [23].

2.3 Information selection

个人觉得这个主题的推荐非常有意义，VIO 非得用几百个特征点吗？哪些特征是有用的？这些真是灵魂拷问，教授为我们推荐了三篇论文[24, 25, 26].

2.4 Deep Learning

主要是语义物体或分割[27]，鲁棒的（视角大，光照变化剧烈）视觉特征[28] 等等。

3 简单总结

个人认为，大佬 Prof. Stergios 推荐的论文虽然不是很完全，但是对 VIO 方向的分类很细，值得参考。我从中收获了几篇不错的论文，祝大家好运。

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