16-833 SLAM Paper Summary 1

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ORB-SLAM: A Versatile and Accurate Monocular SLAM System

ORB-SLAM is a feature-based monocular SLAM system that can operate in real-time. The framework builds upon past developed work and incorporates new ideas to improve the system's accuracy, efficiency, and utility in various use cases. For example, the framework uses the same ORB features for all tasks: tracking, mapping, relocalization, and loop closing to improve computation time. The system also has a novel policy to spawn and cull keyframes, which enables lifelong operations and reduces redundancy. The ORB-SLAM framework was tested extensively using different popular datasets. The results indicated that ORB-SLAM is the most reliable and complete solution for monocular SLAM, at the time of publication.

Visual-LiDAR Odometry and Mapping: Low-drift, Robust, and Fast

V-LOAM is a framework for combining visual and lidar odometry in a fundamental and first principle method that runs in real time. The visual odometry system contains the following sub-systems: feature tracking, frame-to-frame motion estimation, and depth map registration. The motion estimation problem is formulated with 6-DOF and solved using the Levenberg-Marquardt method. On the other hand, the lidar odometry system contains the following sub-systems: sweep-to-sweep refinement, sweep-to-map registration, and transform integration. This sub-system further refines the frame-to-frame motion estimated by the visual odometry and reconstructs a more accurate map cloud. The evaluation results indicate the robustness of the method and its sensor's ability to perform in high-speed motion and significant light change scenarios.

References

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