Optical Flow Localisation and Appearance Mapping (OFLAAM) for Long-Term Navigation

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Abstract : This paper presents a novel method to use optical flow navigation for long-term navigation. Unlike standard SLAM approaches for augmented reality, OFLAAM is designed for Micro Air Vehicles (MAV). It uses an optical flow camera pointing downwards, an IMU and a monocular camera pointing frontwards. That configuration avoids the expensive mapping and tracking of the 3D features. It only maps these features in a vocabulary list by a localization module to tackle the loss of the navigation estimation. That module, based on the well-established algorithm DBoW2, will be also used to close the loop and allow long-term navigation in confined areas. That combination of high-speed optical flow navigation with a low rate localization algorithm allows fully autonomous navigation for MAV, at the same time it reduces the overall computational load. This framework is implemented in ROS (Robot Operating System) and tested attached to a laptop. A representative scenarios is used to analyse the performance of the system.

Keywords : vision, UAV, navigation, SLAM

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