Real-time Visual-Inertial Odometry with the Event Camera

Master’s Thesis

Event cameras define a new type of sensor that outputs pixel-level brightness changes instead of the usual intensity frames produced by conventional cameras. Advantages over standard sensors include a very high dynamic range, no motion blur, and a latency in the order of microseconds. These features render event cameras particularly interesting for applications like tracking and visual odometry. The latter application will be the focus of this work with the goal of facilitating the estimation of the camera ego-motion in challenging conditions, such as high-speed motion or high dynamic range scenes.

Objective:

The aim of the thesis is to implement, analyze and finally improve a current state-of-the-art method for event camera based visual odometry. At first, you will setup a framework to replicate the basic algorithm and analyze its strengths and weaknesses. In a subsequent step different variants and extensions will be implemented and evaluated. The final system should be able to operate in real time under real world conditions.

Qualifications:

- Student of Information and Computer Engineering, Computer Science
- Basic knowledge in computer vision and optimization
- Programming experience in C++

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