BA, MA

High Speed Frame Generation:
Bridging the Gap between Event Based and Frame Based Vision

Event Based Vision, its Challenges & our Approach

Event Based Vision represents a transformative approach to visual sensing, offering unprecedented temporal resolution in the microsecond range. Unlike conventional cameras capturing frames at fixed intervals, these bio-inspired sensors respond instantly to brightness changes, enabling entirely new possibilities in computer vision. The technology combines ultra-low latency, exceptional dynamic range, and minimal power consumption. As a young field, it presents unique opportunities for researchers to make fundamental contributions, particularly in algorithmic development and theoretical understanding.

The widespread adoption of event-based vision faces a significant challenge: while the sensor technology offers unprecedented capabilities, most existing computer vision algorithms and hardware accelerators are optimized for traditional frame-based processing. Binary frames present an elegant solution to bridge this gap, enabling frame rates of 100kHz and beyond - a realm previously thought impossible with frame-based representations. This approach maintains compatibility with established computer vision frameworks while preserving the exceptional temporal resolution of event data. By solving this fundamental interface challenge, we can unlock the full potential of event-based sensors across numerous applications that require both ultra-high-speed vision and established processing pipelines.

Task Description

This thesis tackles the optimization of event-based vision systems by converting event streams into compressed binary frames. Building upon proven in-house concepts for noise filtering and frame generation, you will adapt and implement these methods for real-time inference using C++ or similar languages. Additionally, the project explores FPGA-based acceleration concepts to maximize frame rates.

The concrete scope will be tailored to your individual skill set and interests, welcoming your creative solutions alongside the implementation of existing concepts. This thesis values both achievement of goals and knowledge acquisition in advancing event-based vision technology.

Prerequisites

– Programming Skills (best case: C++)
– Basic knowledge about computing architectures
– Interest in computer vision
– Motivation (!)

Research Area

– Computer Vision
– Event Based Vision
– High-Speed Sensing

Course of Studies

[x] ETIT
[x] Computer Science
[x] Mechatronics and IT

Direction

[x] Implementation
[x] Development
[ ] Literature Research
[x] Sensing

Start

any time

Links

Employee

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