BA, MA

Anytime Algorithms for predictive Tracking

Event Based Vision in Bulk Material Sorting

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.

With this technology, it is thus possible to track fast objects at high frequencies and with low latency, which can be used to optimize sorting processes. Pneumatic valve arrays are used, which must be controlled as precisely as possible to avoid slippage and sorting errors. This requires a prediction of when and where the particle will reach the array.

Using anytime algorithms, this prediction can be retrieved at any time, ensuring enough time remains to control the valve, which makes them particularly interesting for this application.

Task Description

Based on real measurement recordings resp. tracking points, a dataset should be created or expanded to compare different approaches for prediction against each other. Evolutionary algorithms, neural networks, simple extrapolation methods resp. regression approaches or a kalman filter are possible candidates. The tracker itself is already implemented and can be used to generate the data.

The runtime, accuracy, and robustness of the algorithms will be investigated in the context of bulk material sorting applications. The work is being conducted in cooperation with Fraunhofer IOSB.

The specific work packages and objectives will be defined individually according to your knowledge and interests.

Prerequisites

– Basic programming skills (Python)
– Experience with machine learning approaches
– Motivation (!)

Research Area

– Machine Learning
– Event Based Vision
– High-Speed Sensing

Course of Studies

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

Direction

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

Start

any time

Links

Employee

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